POPULAR SCIENCE

MONTHLY

MECHANICS - AUTOS - HOMEBUILDING

25¢ April

Who Is Building the BEST BOMBER?

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All About 18 Little Cars

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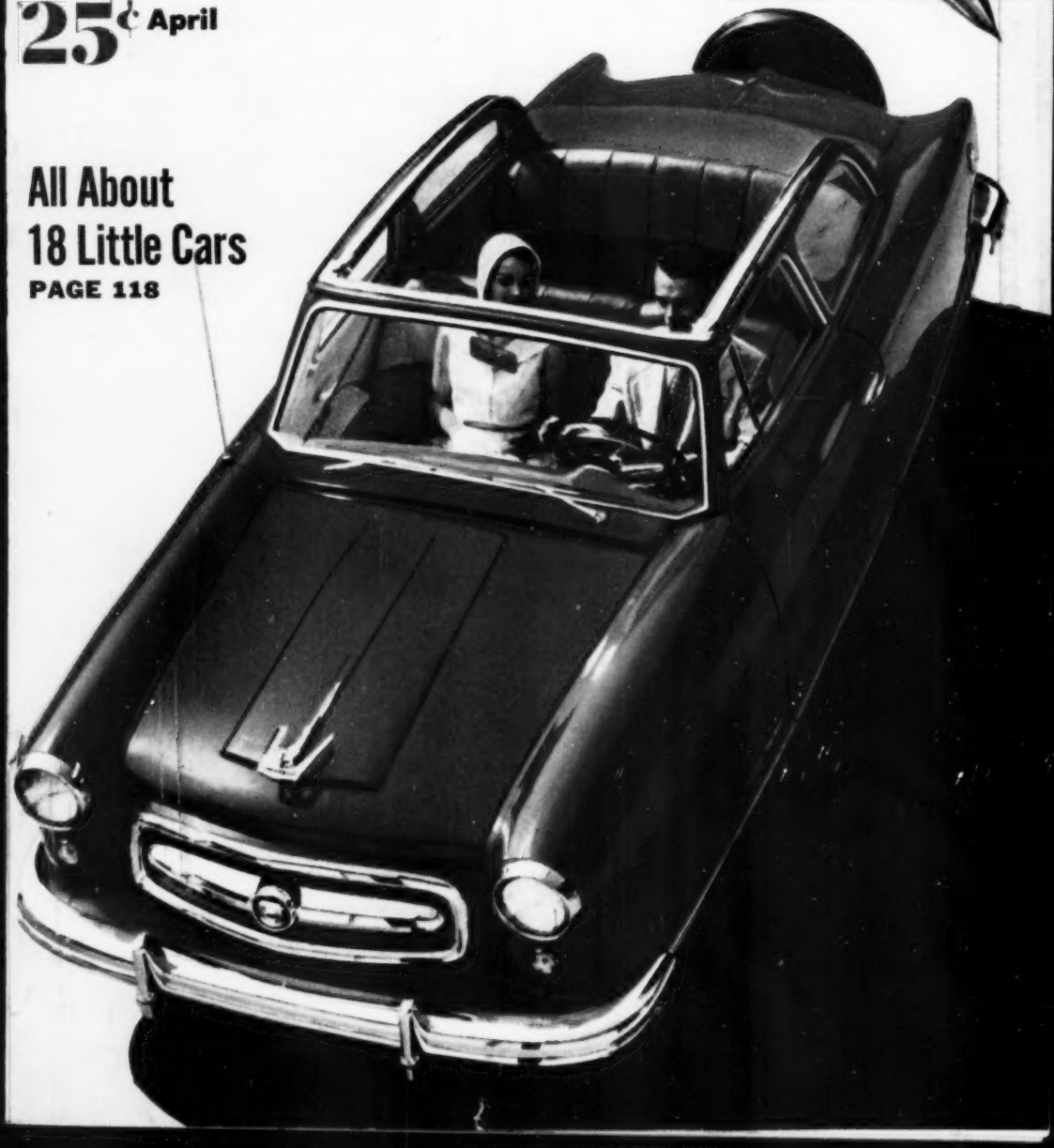

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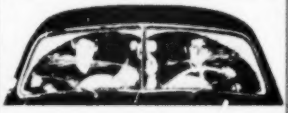

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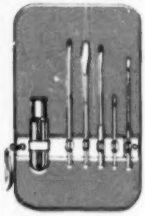

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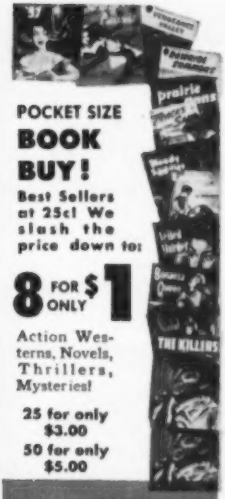

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***The cheapest rubble** you can lug home from a quarry will still make a handsome barbecue fireplace when you use the form-over-form trick described by Paul Corey on page 226. No masonry skills are needed. Corey begins with a junk-yard stove—and no love of hard labor.*

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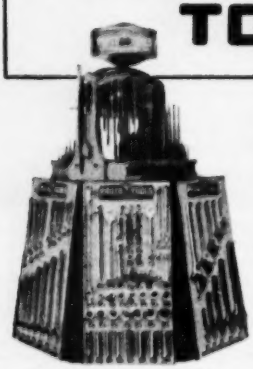

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NEXT MONTH . . . .

How to Be a Space-Snooper

If you never seem to have enough room for all the things you want to store, come along next month when PSM will take you on a space-snooping tour of your home. You'll be surprised at how much space you'll find and what a simple shelf here or a cabinet there can do to turn wasted feet into efficient storage.

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See Sample Puzzle at Upper Right!

This contest consists of puzzles like the SAMPLE PUZZLE at right. Note how we filled it in . . . how we identified the objects and found that certain letters in the names of the objects stood out from the rest, thus to spell out the name of the famous person pictured at the bottom. Read the explanation carefully

Note how we identified each object with a word of as many letters as there are boxes in diagram accompanying it. In upper left we filled in word SHOE; in upper right, TIE. In lower left, TIGER; in lower right, PURSE. Note that some of the letters fell into boxes with a little circular frame inside. Those "circled" letters, arranged into proper order, spell out the famous name we are looking for.

Here, for example, the "circled" letters are H T R U. So we run through the names printed under the puzzle and discover Babe RUTH, whose last name is the correct solution, and whose picture you see at bottom

SAMPLE PUZZLE

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Aaron BURR — Babe RUTH

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The coupon below, without cost or obligation, will bring you our Free Book about the subject you're interested in. You'll also receive, free, our book on "How to Succeed"—a 36-page gold-mine of valuable advice telling Why People Fail, How to Pick Your Goal, How to Develop Your Hidden Talents, etc. To take full advantage of today's job opportunities mail coupon *NOW*.

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ICS

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Without cost or obligation, send me "HOW to SUCCEED" and the booklet about the course BEFORE which I have marked X:

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- ☐ Commercial Art
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- ☐ Show Card and Sign Lettering
- ☐ Fashion Illustrating

AUTOMOTIVE
- ☐ Automobile, Mechanic
- ☐ Auto-Elec. Technician
- ☐ Auto Body Rebuilding and Refinishing
- ☐ Diesel—Gas Engines

AVIATION
- ☐ Aeronautical Engineering Jr.
- ☐ Aircraft Engine Mechanic
- ☐ Airplane Drafting

BUILDING
- ☐ Architecture
- ☐ Arch. Drafting
- ☐ Building Contractor
- ☐ Estimating
- ☐ Carpenter and Mill Work
- ☐ Carpenter Foreman
- ☐ Reading Blueprints
- ☐ House Planning
- ☐ Plumbing
- ☐ Heating
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- ☐ Business Administration
- ☐ Certified Public Accountant
- ☐ Accounting
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- ☐ Stenography and Typing
- ☐ Secretarial
- ☐ Federal Tax
- ☐ Business Correspondence
- ☐ Personnel and Labor Relations
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- ☐ Managing Small Business
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- ☐ Salesmanship
- ☐ Traffic Management

CHEMISTRY
- ☐ Chemical Engineering
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- ☐ Civil Engineering
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- ☐ Architectural Drafting
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- ☐ Industrial Engineering
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- ☐ Foremanship
- ☐ Mechanical Drafting
- ☐ Machine Design-Drafting
- ☐ Machine Shop Practice
- ☐ Tool Design
- ☐ Industrial Instrumentation
- ☐ Machine Shop Inspection
- ☐ Reading Blueprints
- ☐ Toolmaking
- ☐ Gas—Electric Welding
- ☐ Heat Treatment—Metallurgy
- ☐ Sheet Metal Work
- ☐ Sheet Metal Pattern Drafting
- ☐ Refrigeration

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- ☐ Combustion Engineering
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- ☐ Television
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Year of the Six Millionth Student

Name _____ Age _____ Home Address _____

City _____ State _____ Working Hours _____ A.M. to _____ P.M.

Occupation _____

Special tuition rates to members of the Armed Forces. Canadian residents send coupon to International Correspondence Schools Canadian, Ltd., Montreal, Canada.

Photographer's Model turns grime-covered car into glistening beauty in 37 minutes at cost of only 46 cents

New LIQUID PLASTIC car polish called I. C. U. PLASTICOTE astounds car specialists

I.C.U. PLASTICOTE with Kelvex is a liquid plastic, not a wax—can be applied in bright sunshine. Smooth, glass-like surface, resists dust and grime. Makes polish last longer.

1. **"NO WASHING!"** — she emphasizes as she rubs PLASTICOTE on easily and quickly. It removes dirt and oxidation, then deposits a long-lasting high gloss, plastic finish on the car.

2. **TIME-JUDGE ANNOUNCES:** "That took you just 16 minutes" as model smiles and accents the fact that there was no hard rubbing or great effort involved.

3. **"FINISHED IN 37 MINUTES"** announces the Judge. Model points out that she used just about ⅓ of a can of PLASTICOTE. Note: Checking disclosed she used exactly 46 cents worth.

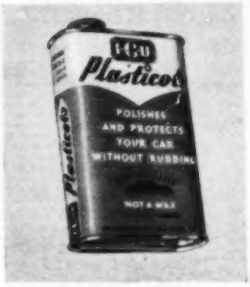
"PLASTICOTE — the new *liquid plastic* car polish—outsells all other polishes, bar none."—Warren's Amoco Service, Vero Beach, Fla.

IN SOME WESTERN STATES, THIS PRODUCT IS SOLD AS I.C.U. AUTO POLISH

4. MODEL EXCLAIMS: "Beautiful, isn't it!" and points out PLASTICOTE'S four advantages over wax polishes—One, you don't need shade—Two, you don't have to wash your car—Three, you don't have to rub hard—Four, it lasts longer. I.C.U. PLASTICOTE cleans, coats, polishes, and protects in one easy operation.

"I USE PLASTICOTE — a liquid plastic — not a wax. It does not streak, smear, or blotch — and not even professional car washing like I do with strong detergents removes PLASTICOTE."

BRING BACK THAT NEW CAR LOOK! GET I.C.U. PLASTICOTE WITH KELVEX— the new *liquid plastic* car polish—at your favorite filling station, auto supply store, or car dealer.



Only $1.25. The original plastic auto polish in the red and white can. A year's supply!

THE LIVINGSTON COMPANY — I.C.U. PRODUCTS
150 Amity Road, New Haven 15, Conn.

☐ SEND ME FREE LITERATURE ON THE NEW I.C.U. PLASTICOTE.

NAME.....

ADDRESS.....

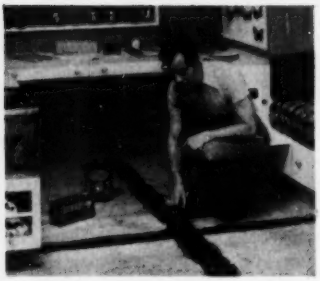
CITY.....ZONE....STATE.....

Manufactured and distributed in Canada by Ewart-Harris Company, Verdun, P. Q.

Turn your attic into a *colorful* new room—

Install a long-lasting KENTILE FLOOR

like this for only **$17.50***



Handy Ken-Kit has complete easy-to-follow instructions—all the tools you need. After floor has been measured, chalk line is snapped. Next, Kentile Adhesive is spread.

Tiles go down one at a time. After first half is done, Kentile Adhesive is spread and tiles set in remaining area. And, once in place, your Kentile Floor is ready to walk on.

A Kentile Floor like this costs $8 to $20 less than tile floors of many other materials . . . yet Kentile is guaranteed!

Kentile's 25 modern colors give endless design opportunities to make your new room the show spot of your home. Kentile is easy to clean with mild soap and water washings ...glows like new with occasional no-rub waxings. Colors never wear off...because they go clear through to the back of each rugged, dirt and stain-resistant tile. Remember, only your Kentile Dealer carries guaranteed Kentile.

*Price quoted is for a Kentile Floor approximately 6′ x 10′ 6″ installed by you. Your floor may cost less or slightly more, depending on size, colors and freight rates to your city. See your local Kentile Dealer...He's listed in the classified phone directory under FLOORS...In Canada, T. Eaton Co., Ltd.

KENTILE, INC.
58 2nd Avenue, Brooklyn 15, N. Y.

KENTILE

GUARANTEE

Kentile, Inc., will furnish new tile without charge for any Kentile that wears out and on which colors wear off during your own occupancy of your own home wherein you have installed Kentile or have had it installed by an authorized Kentile Dealer. This guarantee does not apply to damage caused by your improper handling or your failure to follow the instructions for installation and/or maintenance available at your Kentile dealer's. This guarantee must be presented if claim is made for new tile.

KENTILE®

The Asphalt Tile of Enduring Beauty

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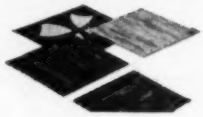
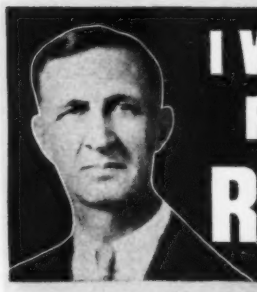




I WILL TRAIN YOU AT HOME FOR GOOD PAY JOBS IN RADIO-TELEVISION

J. E. SMITH has trained more men for Radio-Television than any other man.

America's Fast Growing Industry Offers You

2 FREE BOOKS SHOW HOW
MAIL COUPON

I TRAINED THESE MEN

LOST JOB, NOW HAS OWN SHOP
"Got laid off my machine shop job which I believe was best thing ever happened as I opened a full time Radio Shop. Business is picking up every week."—E. T. Slate, Corsicana, Texas.

GOOD JOB WITH STATION
"I am Broadcast Engineer at WLPM. Another technician and I have opened a Radio-TV service shop in our spare time. Big TV sales here . . . more work than we can handle."—J. H. Bangley, Suffolk, Va.

$10 TO $15 WEEK SPARE TIME
"Four months after enrolling for NRI course, was able to service Radios . . . averaged $10 to $15 a week spare time. Now have full time Radio and Television business."—William Weyde, Brooklyn, New York.

SWITCHED TO TV SERVICING
"I recently switched over from studio work and am now holding a position as service technician. I am still with RCA, enjoying my work more and more every day."—N. Ward, Ridgefield, N. J.

1. EXTRA MONEY IN SPARE TIME

Many students make $5, $10 a week and more EXTRA fixing neighbors' Radios in spare time while learning. The day you enroll I start sending you SPECIAL BOOKLETS that show you how. Tester you build with kits I send helps you make extra money servicing sets, gives practical experience on circuits common to Radio and Television. All equipment is yours to keep.

2. GOOD PAY JOB

NRI Courses lead to these and many other jobs: Radio and TV service, P.A., Auto Radio, Lab, Factory, and Electronic Controls Technicians, Radio and TV Broadcasting, Police, Ship and Airways Operators and Technicians. Opportunities are increasing. The United States has over 105 million Radios—over 2,900 Broadcasting Stations—more expansion is on the way.

3. BRIGHT FUTURE

Think of the opportunities in Television. Over 15,000,000 TV sets are now in use; 108 TV stations are operating and 1800 new TV stations have been authorized . . . many of them expected to be in operation in 1953. This means more jobs—good pay jobs with bright futures. More operators, installation service technicians will be needed. Now is the time to get ready for a successful future in TV! Find out what Radio and TV offer you.

WANT YOUR OWN BUSINESS?

Let me show you how you can be your own boss. Many NRI trained men start their own business with capital earned in spare time. Robert Dohmen, New Prague, Minn., whose store is shown at left, says, "Am now tied in with two Television outfits and do warranty work for dealers. Often fall back to NRI textbooks for information."

You Learn Servicing or Communications by Practicing With Kits I Send

This Is Just Some of the Equipment My Students Build. All Parts Yours to Keep.

Keep your job while training at home. Hundreds I've trained are successful RADIO-TELEVISION Technicians. Most had no previous experience; many no more than grammar school education. Learn Radio-Television principles from illustrated lessons. You also get PRACTICAL EXPERIENCE. Pictured at left are just a few of the pieces of equipment you build with kits of parts I send. You experiment with, learn circuits common to Radio and Television.

Mail Coupon—find out what RADIO-TELEVISION Can Do for You

Act Now! Send for my FREE DOUBLE OFFER. Coupon entitles you to actual Servicing Lesson; shows how you learn at home. You'll also receive my 64-page book, "How to Be a Success in Radio-Television." Send coupon in envelope or paste on postal. J. E. SMITH, Pres., Dept. 3DB, National Radio Institute, Washington 9, D. C. Our 37th Year.

Television Is Today's Good Job Maker

TV now reaches from coast-to-coast. Qualify for a good job as a service technician or operator. My course includes many lessons on TV. You get practical experience . . . work on circuits common to both Radio and Television with my kits. Now is the time to get ready for success in Television!

The ABC's of SERVICING

Good for Both—FREE

Mr. J. E. Smith, President, Dept. 3DB
National Radio Institute, Washington 9, D. C.

Mail me Sample Lesson and 64-page Book, "How to Be a Success in Radio-Television." Both FREE. (No salesman will call. Please write plainly.)

Name.....Age.....

Address.....

City.....Zone.....State.....

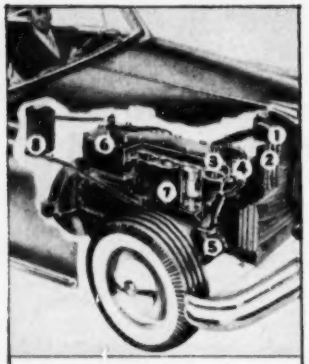
Approved under G.I. Bill

Cooling system failure—on the New York Southern State Parkway last summer—stranded these motorists.

NEW DU PONT ANTI-RUST

and Water Pump Lubricant

RETARDS RUST FORMATION, NEUTRALIZES CORROSIVE ACIDS



HERE'S WHERE Du Pont Anti-Rust works in your car's cooling system to neutralize acid, retard rust and corrosion, lubricate moving parts. 1. Radiator tanks. 2. Water tubes. 3. Thermostat. 4. Water pump. 5. Hose connections. 6. Cylinder head. 7. Cylinder wall. 8. Heater.

Just pour it in the radiator, leave it in!

Now, you can easily eliminate one hot-weather worry—failure of your car's cooling system. Most overheating is caused by clogging due to rust, and corrosive attack. New Du Pont Anti-Rust not only inhibits rust, but neutralizes acids and lubricates the water pump as well.

Best of all, liquid Du Pont Anti-Rust is simple to use. Just pour it in your radiator and forget it. It starts immediately to protect you against troublesome breakdowns and costly repairs. And Anti-Rust can't clog . . . is harmless to hose or metal parts. Get it at your service station or auto supply store—$1.00 at most dealers.

DU PONT

REG. U.S. PAT. OFF.

Better Things for Better Living
...through Chemistry

DU PONT SPRING DRAIN-OUT:

Ask at your garage or service station about this complete summer protection. The service includes 1. Draining out winter-worn anti-freeze. 2. Thoroughly cleaning out rust and scale with Du Pont Cooling System Cleanser. 3. Adding Du Pont Anti-Rust and Water Pump Lubricant. 4. Checking all cooling system parts.

DU PONT COOLING SYSTEM CLEANSER

Get into a High Pay ACCOUNTING CAREER

LaSalle's famous staff of Accounting authorities are helping thousands prepare for fast promotions and bigger pay. They can do the same for you!

If your heart is set on a larger income and all that it means . . . better home—fine car—larger bank account—more of the good things of life. . . .

If that's your ambition and you are really serious about it, then you owe it to yourself to get the REAL FACTS about Accountancy, and the many good-pay opportunities that can be YOURS through LaSalle's famous Problem Method plan.

It matters not whether you've had a single day of experience in this field—or whether you have already started but want to climb higher. LaSalle's expert training is designed to take you *from where you are . . . to where you want to be . . .* in higher positions and a lifetime career of security and good income.

WHY YOU CAN'T FAIL TO GAIN

You see on this page a panel of experts who know Accounting from A to Z . . . all the way from simple bookkeeping, on up through advanced accounting, cost accounting, auditing, income tax, and coaching for the C.P.A. degree. These are only part of LaSalle's instruction staff. But what is most important to you . . .

. . . THESE C.P.A. EXPERTS KNOW HOW TO IMPART THEIR KNOWLEDGE TO OTHERS . . . HOW TO HELP YOU PREPARE QUICKLY YET THOROUGHLY FOR SUCCESS IN THIS VERY LUCRATIVE FIELD

The proof? What stronger proof could there be than more than 3,500 Certified Public Accountants (approximately 10% of the U.S. total) who have trained with LaSalle? Or the hundreds of thousands of men and women whom LaSalle has helped qualify rapidly for more money, a brighter future, in a high-pay-lifetime career? These thousands came to us with different backgrounds of experience and varying degrees of ambition. Many have reported raises and promotions after only a few weeks of training. Thousands of them have written to say they are now earning 50% more—even *double* their former incomes—*often in less than a year.* These letters are published in book form for your inspection. They were written by real people, with real income, problems and ambitions—people who might be your next-door neighbor.

Yes, if you are really sincere in wanting to better your position—start your income climbing—enjoy a lifetime career of high standing and high reward—this friendly staff of experts can help you.

SEND FOR FREE SAMPLE LESSON . . . ALSO BIG 48-PAGE BOOK OF LATEST INFORMATION ABOUT CAREER OPPORTUNITIES

You don't have to wonder what LaSalle's Accountancy plan is like. You will be sent a free sample lesson, which does not obligate you in any way. Study it—keep it—see for yourself how simple, clear, and easy it is to master. This is an actual lesson right out of the regular training—to show you exactly how LaSalle's Problem Method has trained more than 1,275,000 men and women from all walks of life.

Also . . . the 48-page book, "Accountancy, the Profession That Pays," gives all the latest facts about the new and growing opportunities in five different fields of profitable employment.

This can be an important day in your life. A coupon like the one below has started hundreds of thousands of men and women toward a bigger job, a larger income. It can do the same for you.

Mail the Coupon Today!

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417 S. Dearborn St., Dept. 483-H, Chicago 5, Ill.

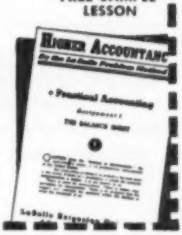
Send free Sample Lesson in Accounting—also, 48-page free book, "Accountancy, the Profession That Pays" . . . all without cost or obligation.

Name ..... *Age* .....

Address .....

City & Zone ..... *State* .....

FREE SAMPLE LESSON



AMERICA'S BIGGEST RADIO VALUE!

THE MIGHTY MIDGET

$49.95

MODEL SW-54

4-BAND RECEPTION AT A 2-BAND PRICE!

With the "Mighty Midget", National's SW-54, you hear not only the broadcast band, but 3 shortwave bands beside! Voice, music and code reception guaranteed from 540 kcs. to 30 mcs.! Listen to Berlin, Paris, Moscow, London, Argentina — every country on the globe — PLUS police, ships, aircraft, radio amateurs! Yet the SW-54 costs less than many two-band table radios!

BY NATIONAL

"The Royalty of Radio!"

National radio receivers are used by the U. S. Navy, Scotland Yard, Idlewild Airport, movie makers, steamship lines, scientists and radio amateurs the world over!

National

NATIONAL COMPANY, Inc.

MALDEN, MASSACHUSETTS

FREE!

See and hear the Mighty Midget and get your free copy of "The Shortwave Listeners' Guide" (tells what you can hear, when and where, in shortwave radio).

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Yukon Rad., 655 6th Ave., Fairbanks

CALIFORNIA
Henry Rad., 11240 W. Olympic Blvd., Los Angeles
Rad. Prod. Sales, 1501 So. Hill St., L. A.
Elmar Electron., 140 11th St., Oakland
Montgomery Ward & Co., Oakland
Zack Rad., 225 Hamilton Ave., Palo Alto
Zack Rad., 1426 Market St., S. F.
T.V. Rad. Sup., 408 Market St., S. F.
S. F. Rad. & Sup., 1282-84 Market St., San Francisco

COLORADO
Montgomery Ward & Co., Denver
Rad. Products Sales, 1237 16th St., Denver

DELAWARE
Almo Rad., 6th & Orange St., Wilmington

DISTRICT OF COLUMBIA
Sun Rad., 338 "F" St., N. W., Wash.
Kenyon Rad. Sup., 2214, 14th St., N. W., Washington

FLORIDA
Herman Rad. Sup. Co., 1365 N. W. 23rd St., Miami

ILLINOIS
J. G. Bowman, 515 E. 75th St., Chicago
Allied Rad., 833 W. Jackson Blvd., Chi.
Newark Elec., 223 W. Madison St., Chi.
Montgomery Ward, 618 W. Chicago Ave., Chicago
Hudson-Ross, Inc., 111 W. Jackson Blvd., Chicago

IOWA
World Rad. Lab., Inc., 740 West Broadway, Council Bluffs

LOUISIANA
Southern Rad. Sup. Co., 1900 Tulane Ave., New Orleans

MARYLAND
Montgomery Ward, Baltimore

MASSACHUSETTS
Hatry & Young, 811 Boylston St., Boston
Jordan Marsh Company, Boston
Rad. Wire Television, 110 Federal St., Boston
Boston Ship Serv., 230 State St., Boston

MICHIGAN
M. N. Duffy & Co., 2040 Grand River Ave., W., Detroit
Reno Rad. St., Inc., 1314 Broadway, Det.

MINNESOTA
Lew Bonn Co., 1211 LaSalle Ave., Minn.
Montgomery Ward & Co., St. Paul

MISSOURI
Radiolab, 1612 Grand Ave., Kansas City
Burstein-Applebee Co., 1012-14 McGee St., Kansas City
Walter Asha Rad. Co., 1125 Pine St., St. Louis

NEW JERSEY
Almo Rad. Co., 4401 Ventnor Ave., Atlantic City
Almo Rad. Co., 1133 Haddon Ave., Camden
Davega Stores, Inc.:
325 Main St., Hackensack
2839 Hudson Blvd., Jersey City
110 Market St., Newark
373 George St., New Brunswick
185 Main St., Paterson
Rad. Wire Television, 24 Central Ave., Newark
Rad. Wire Television, 139 W. 2nd St., Plainfield

NEW YORK
Ft. Orange Dist. Co., 904 Bdwy., Albany
Montgomery Ward, Albany
Rad. Equip. Corp., 147-151 Genesee St., Buffalo
Davega Stores, Inc.:
31-55 Steinway St., Astoria 3, L. I.
924 Flatbush Ave., Brooklyn
39-11 Main St., Flushing, L. I.
45 Main St., Hempstead, L. I.
163-24 Jamaica Ave., Jamaica
96-70 Queens Blvd., Rego Park, L. I.
175 Main St., White Plains, L. I.
27 Main St., Yonkers
Rad. Wire Television, 542 E. Fordham Rd., Bronx

NEW YORK CITY
Harvey Rad., Inc., 103 W. 43rd St.
Federated Electron. Sales, 66 Dey St.
Terminal Rad. Corp., 85 Cortlandt St.
Rad. Wire Television, 100 Sixth Ave.
Davega Stores, Inc., 63 Cortland St.
Nat Unger, Inc., 174 Greenwich St.
Harrison Rad., 10 W. Broadway
Maritime Rad., 24 Whitehall St.

OHIO
Selectronic Sup., 1013 Jefferson Ave., Toledo

OKLAHOMA
Radio, Inc., 1000 So. Main, Tulsa

OREGON
Un. Rad. Sup., Inc., 179 W. 8th, Eugene
PORTLAND
Pacific Stationery, 414 S. W. 2nd Ave
Un. Rad. Sup., Inc., 22 N. W. 9th
Montgomery Ward & Co.

PENNSYLVANIA
Almo Rad. Co., 412 No. 6th St., Phila.
Almo Rad. Co., 509 Arch St., Phila.
Eugene G. Wile, 218 So. 11th St., Phila.

TEXAS
Hargis Co., 410 Baylor St., Austin
Montgomery Ward & Co., Fort Worth

VIRGINIA
Rad. Sup. Co., Inc., 711 Granby St., Norf'k

WASHINGTON
Seattle Rad. Sup., Inc., 2117 Second Ave., Seattle

WISCONSIN
Radio Parts Co., Inc., 536-38 W. State St., Milwaukee
Samson's:
222 E. Erie St., Milwaukee
2nd and Wells, Milwaukee
3rd and Lloyd, Milwaukee
8th and Mitchell, Milwaukee

INVENTORS

Learn how to protect your invention. The U. S. Patent Laws provide that any new and useful art, machine, article of manufacture, or composition of matter, or any new and useful improvement thereof, may be patented if the act of invention is involved. Therefore, every inventor with a valuable invention should take advantage of the Patent Laws and proceed for patent protection in order to safeguard his rights.

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Registered Patent Attorneys

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WASHINGTON 5, D. C.

DOES YOUR TV SET HAVE TO COST YOU FROM $25—$90 A YEAR FOR REPAIRS?

Not if you know a few simple things about your television set . . . not if you know when you really need a serviceman . . .

and when your trouble can be corrected with a minor, simple, safe adjustment you can make yourself . . .

You've seen a serviceman come in to work on your set. He taps this and twists that. Then he either replaces a tube, or makes an adjustment on a part. All he has to do is recognize and locate the trouble, and then make the correction.

You don't have to be a mechanical genius to be able to make many of these same adjustments on your set yourself. If you have ever put a new washer on your water faucet, or changed a tire on your automobile, or attached a new plug to an electric cord—you have enough "mechanical background" to be able to take care of all "nuisance repairs" yourself, and probably of most other things that go wrong with a set.

Amazing New TV Owner's Self Repair Book Takes the Mystery Out of TV Repairs

With the amazing new TV Owner's Self Repair Book, you can have a television expert at your side whenever you need it. Now, every time your set begins to flicker or jump, or becomes distorted or dissolved into lines or zags—a flick of the finger to the right page **SHOWS YOU EXACTLY WHAT CONTROL** knob to turn to correct the trouble in less than one minute! From now on, every time you're annoyed by "ghosts," snow or weak channel reception—the TV Owner's Self Repair Book shows you how to effect a quick 15-minute repair job that eliminates these faults and restores the set to perfect, movie-clear reception.

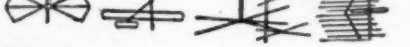
IT HAS BEEN PROVEN THAT 1 OUT OF EVERY 3 TV FAULTS IS CAUSED BY A WEAK OR BURNT OUT TUBE. Just by replacing a tube you can correct fully 33⅓% of the troubles that may develop in a set. The TV Owner's Self Repair Book shows you how to safely locate and change the bad tube in less than 5 minutes.

Contains special tube diagrams that spot faulty tubes immediately . . . a complete section on antennas . . . interference . . . covers T.V. set models from 1947-1952 . . . all makes . . . all sizes.

When you check your trouble and find that it is due to a faulty tube, you are led right to it. You simply find the diagram for your set and the one (or more) tubes you are to check—and **THE ONE TO REPLACE** are pinpointed for you! You are directed right to it. No blind guessing or hunting for the bad tube. **ONLY IN THIS BOOK,** has there been developed a special identification method to make it a cinch to locate the bad tube. Each tube in each diagram not only carries its usual trade identification number, but also a special letter to identify its function and location as well. It's (1) find the trouble, (2) find the tube, bingo, (3) replace the tube—and that's all there is to it!

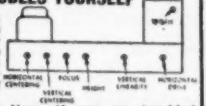
Which Type of Antenna Is Best for Your Set

The special chapter on antennas explains what an antenna is supposed to do; the reason for the different shapes and arrangements; the reason for "stacking" and multiple antennas; how to "orient" an antenna for best reception; the need and use of a "rotator"; the special antennas for "fringe" areas; how to install, change or add antennas and parts; information on complete antenna installation kits which are available. Just about everything practical that you need to know about antennas.



Do This Right Now and Prove You Can FIX TV TROUBLES YOURSELF

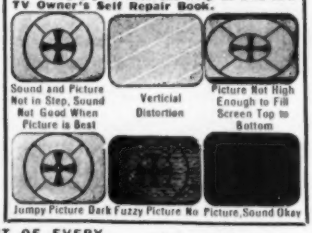
Turn your set around. You will find in the back of it an arrangement of "rear controls" looking like this:



Zags on Your Screen

Now, if you are troubled with these zags on your screen, locate Hor. Drive on the above rear panel. Turn control slowly to left. Zags will disappear and you will have a perfect picture on your screen. That's all there is to it. You have made a $5 repair in less than 5 minutes.

A few other repairs that you can make yourself without tools, without any special knowledge, just with the help of this new TV Owner's Self Repair Book.



6 Easy Ways to Eliminate Interference

In the TV Owner's Self Repair Book there is a unique chapter devoted just to elimination of interference. This chapter tells you just what "interference" actually is. It describes and illustrates the interference symptoms or patterns which appear on your screen in the form of diagonal lines, vertical lines, herringbone or hyphens all over the screen, etc. **This chapter gives you the easy ways to eliminate interference, doing it yourself in a few minutes.**

Complete Price Lists of All Tubes

The TV Owner's Self Repair Book contains a full listing of every tube used in TV sets, fully identified with number, and also listing of picture tubes and with the fair retail prices (by the way, prices range from $1.10 for a 5YEGT tube to **$6.60** for a 6CDG tube and up to $101.00 for a 24 inch picture tube, 24BF4). A full listing, also, of standard and reasonable charges for every type of television service and repair job. No longer need you be in the dark when it comes to knowing what a job should cost. Now you can make your own minor repairs and in addition know just how expensive "Expensive" repairs should really be.

A Practical Reference Book & Reading Course Combined in One Big Volume... for Only

$1.98

An Amazing Bargain, Actual Size 6x9 Inches, 160 Pages, Over 300 Illustrations And How To Do It Pictures

Never Before Such a Complete Authoritative Book for So Little Money!

It contains chapters devoted to GETTING ACQUAINTED WITH YOUR TV SET, telling you how the set is put together, how to understand the controls, how to operate the set, why a "test" pattern is needed—and HOW A TV SET WORKS, telling you how pictures and sound are broadcast and received. Included in the broad scope of this book, is complete information on HOW TO DIAGNOSE TROUBLES IN YOUR TV SET, telling you how to spot faults due to poor adjustment, faults due to wear and breakdown of tubes and parts, faults due to outside causes including extreme distance from telecasting center; also HOW TO CURE YOUR TROUBLES IN THE SET, telling you with pictures and descriptions just how to go about replacing tubes, parts, HOW TO MAKE VARIOUS ADJUSTMENTS and how to do all this without the slightest danger to yourself or to your set! There is also a special chapter devoted to television accessories, such as boosters, what they do, interference, Traps, Glare Filters, Antenna Couplers, which means a master antenna system which permits the operation of two sets from a single antenna, and much, much more.

Unconditional Money Back Guarantee!

Let us send you a copy of this TV Owner's Self Repair Book. Look at it, go through it, read the general information it offers on how a TV set works. Use it to adjust the controls on your set to 100% perfection. Use it, above all, in making your next "fix-it" job on your set. Then—if you don't think that it is the best book of its kind on the market, that it will save you up to a possible $300 on repairs and adjustments on your set during its life, return it to us. We'll promptly send your money back. You must be satisfied 100% or it costs you nothing to examine and try the book—in your home on your set. What could be fairer? But send for the book now and enjoy the best television reception from your set right away!

SEND NO MONEY unless you wish

HOMECRAFTS, DEPT. TM-11
799 Broadway, New York 3, N. Y.

Please send me the TV OWNER'S SELF REPAIR BOOK immediately. I agree to pay postman on arrival $1.98 plus C.O.D. postage. If the book does not help me get a clearer, sharper, better defined picture than I am now getting—if the book doesn't make it possible for me to fix or repair my own set, if I am not 100% satisfied, I may return the book for my full money back!

NAME.....
(Please print plainly)

ADDRESS.....

CITY & ZONE.....STATE.....

☐ SAVE MORE! If you enclose $2 cash, check, or money order with this coupon, we pay all postage charges. Same unconditional money back guarantee!

INVENTORS

If you believe that you have an invention, you should find out how to protect it. The first step is to have a search made of the prior pertinent U. S. patents. If a report on this search indicates that the invention appears patentable you can apply for a patent, and the specifications and claims should be prepared.

The firm of McMorrow, Berman & Davidson, with offices in Washington, D. C., is qualified to take the necessary steps for you. We can make a preliminary search on your invention, advise you whether we think it can be patented, and prepare your application for patent.

Unless you are fully familiar with the U. S. Patent Laws, we recommend that you engage the services of a Registered Patent Attorney to protect your interests. The patent laws are *your* laws. A patent gives you the right to prevent others from making, using or selling the invention claimed in your patent for a period of 17 years.

Use these patent laws for your protection. Investigate whether your invention can be patented. If you have what you believe to be an invention, we suggest that you have this firm make a search for you.

Send for a copy of our Patent Booklet entitled "How To Protect Your Invention," containing information about patent protection and patent procedure. Along with this we will also send you an "Invention Record" form, for your use in writing down and sketching details of your invention. We will mail them promptly. No obligation. They are yours for the asking.

McMORROW, BERMAN & DAVIDSON

Registered Patent Attorneys

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142-H VICTOR BUILDING, WASHINGTON 1, D. C.

SELF-CHARGING NEUTRONIC PLATE

Battery Actually Lasts the

***Why do batteries cost so much and wear out so soon?** EVERY YEAR, about 47% of all car owners have to pay $16-$28 for a new battery. Why? Can't Batteries be improved?*

HERE ARE THE FACTS: technically, there never has been any reason why a battery could not be built that would last 5 or 6 times as long as conventional batteries. In fact, such batteries have been built for years but have not been available to the American public because of foreign patent rights.

AT LAST—basic German patents plus American production know-how have been combined to produce this Lifetime *Battery at the cost of an ordinary battery!*

Charges and Re-Charges Automatically—Under exacting laboratory tests, batteries were deliberately discharged more than 400 times, and each time they automatically "bounced back" to life within minutes. Virtually *impossible* to run down! Test batteries are still in operation after 10 years . . . no one knows how many additional years they may last.

Secret Alloy Plates Defy Decomposition—Unlike ordinary zinc and lead battery plates which crumble, fall to the bottom of the case and eventually "short out," the amazing Neutronic plates developed for the *Lifetime* battery are a special alloy of high molecular stability.

High Amperage—Engineered for Sub-Arctic Use—With more than 15 amperes higher power than any other car battery, the *Lifetime* battery gives an added boost needed for quick starts in coldest climates. Can't freeze even at sub-zero temperatures. Far more power than needed for starter, electric top and windows, lights, radio, heater, horns, wipers, electric fuel pumps, transmission, etc.

Full 6-Year Guarantee Saves You Up to $90—The average battery lasts 1.4 years at an average cost of $19.55, or $85.51 for a 6-year period. Why keep throwing this money away? The new *Lifetime* battery can easily be transferred to your new car when you trade in.

DEALER INQUIRIES INVITED

ORDER BY MAIL

we pay shipping

If your dealer can't supply you with the Lifetime Battery, send us your name and address, plus make, model and year of car, and we will ship battery at once.

ONLY

POSTPAID

(cash, check, money order), or enclose $5.00 deposit, pay balance plus shipping charges C.O.D.

One price for all cars: only $24.95 postpaid ($28.95 for 12 volt).

FREE INSTALLATION!

We pay cost anywhere.

CONSOLIDATED ENGINEERS
Dept. BS-4, 10411 W. Washington Blvd., Culver City, Calif.

Consolidated Engineers, Dept. BS-4
10411 W. Washington Blvd., Culver City, Calif.
Please ship LIFETIME Battery at once:

☐ 6-volt ($24.95) ☐ 12-volt ($28.95)

for_____
(make model, year of car)

☐ I enclose cash, check, or money order; you pay shipping costs.
☐ I enclose $5 deposit; will pay balance & shipping costs COD.

Name_____

Address_____

City_____ Zone____ State_____

6-Year Guarantee

Backed by $75,000 Insurance

No other battery produced today—or probably for many years to come—dares to make this guarantee. Every *Lifetime* Battery must pass rigid tests for peak power, endurance and automatic re-charging before it even leaves the factory. Guaranteed to give 100% satisfactory service for 6 years. (Special guarantees available for commercial, industrial and farm use).

TRAINED YOUNG AND OLDER MEN—URGENTLY NEEDED IN VITAL FIELDS!

ELECTRICITY—RADIO—TELEVISION—ELECTRONICS—VITAL in defense program. Trained men whether 16 or up to 50 needed. TRAIN QUICKLY for better rating if drafted—Vital job in industry if not.

LARGEST, OLDEST, BEST EQUIPPED SCHOOL OF ITS KIND IN THE U.S.

TELEVISION-RADIO

Here at COYNE you're trained for Television, Testing, Trouble-Shooting on Radio, Public Address, F. M. Sound Units, etc. Many Coyne trained men in good jobs or own well paying Television-Radio businesses of their own.

ELECTRICITY

Big future in Power Plant Work, Motors, Industrial Electronics, Armature Winding, Home and Factory Wiring, Appliances, Refrigeration, Maintenance, Illumination, etc. Lifetime job service to Coyne graduates.

WE TRAIN YOU IN CHICAGO

Our famous Practical-Technical method gives you practical experience on a massive outlay of equipment. Actual shop work plus necessary technical training. You are trained right here in the great Coyne shops. Send for BIG FREE BOOK.

APPROVED FOR VETERANS

START NOW—PAY LATER

Enroll now, pay most of tuition after graduation. **Special plan for men of draft age.** We'll help you get part-time work, if you need it to help pay living costs while at Coyne.

B. W. COOKE, President

COYNE SCHOOL

A TECHNICAL TRADE INSTITUTE CHARTERED NOT FOR PROFIT
Established 1899
500 S. Paulina Dept. 43-73H
Chicago 12, Illinois

ELECTRICITY ★ TELEVISION ★ RADIO ★ REFRIGERATION ★ ELECTRONICS

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Whether you prefer Television-Radio or Electricity, train on actual equipment at Coyne. We will send you a Big, fully Illustrated Book. Indicate below which course interests you most. No salesman will call. Mail coupon TODAY.

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☐ TELEVISION-RADIO ☐ ELECTRICITY

NAME.....

ADDRESS.....

CITY.....STATE.....

Letters

We'll Take Your Word for It

I refuse to accept Wilbur Shaw's report that the top speed of the Packard Patrician is 102 m.p.h. [Dec., p. 115]. Our family car is a '52 Packard "300"—20 hp. less than the '53. Last August, while I was home on leave and driving with two of my buddies, a friend of mine who drives an Olds 98 passed us. Well sir, he told me afterwards that when I passed *him* he was doing 125 m.p.h. And my buddies said our speedometer was on zero, which means 130 m.p.h. Of course, allowance must be made for speedometer correction.

A/3c John A. Trovato, Scranton, Pa.

Car Connoisseur Gobbles Up PSM

The February issue of Popular Science was the best I have ever seen and I've been reading PSM for quite a few years. I'd

rather read about cars than eat and I really feasted on those feature articles about the new models and that "Check List of 1953 Cars."

Wally Benefiel, Medicine Lodge, Kan.

Binaural Music on the Campus

Your readers might be interested in knowing that Radio Rensselaer at Rensselaer Polytechnic Institute, Troy, N. Y., has been broadcasting a regularly scheduled program of binaural music. Two AM stations are used, WHAZ, operated by the engineering department of the school, and WRPI, a member of the Intercollegiate Broadcasting

NEWS from SCIENCE
ABOUT YOUR HAIR

Laboratory discovery outdates messy hair oils!

"V-7," completely new *greaseless* grooming agent, now in Vitalis Hair Tonic. It's *not* an animal, vegetable or mineral oil!

Hair stays neat all day

No gummy film, no oily or matted-down look with new Vitalis!

Kills dandruff germs, too!

New Vitalis kills *on contact* germs many doctors associate with infectious dandruff. Feels *"tingling good"* on scalp!

NEW FINER
VITALIS®
HAIR TONIC
WITH "V-7"

Product of Bristol-Myers

NOW...from D.T.I.'s MILLION DOLLAR TRAINING CENTER

Learn to master TELEVISION RADIO - ELECTRONICS by getting EVERYTHING YOU NEED!

America's amazing multi-billion dollar Television field now offers you a chance of a lifetime to get started toward a grand job or your own business. With TV station limit now raised from over 100 to 2053, Television is headed for almost every community. Mail coupon today. See how you may prepare to cash in on the coming TV BOOM.

NOW— get training to suit your NEEDS • TAKE YOUR CHOICE

Get ALL of your training AT HOME!...*including setting up your own HOME LABORATORY*

See how you may now get one of today's most complete, effective combinations of major home training aids—including (1) well illustrated lessons, (2) the wonderful aid of HOME TRAINING MOVIES and (3) 21 big shipments of electronic parts for setting up your own HOME LABORATORY. You work over 400 construction and test procedures to get the practical experience you need. This includes building and keeping a 5 INCH "SCOPE," jewel bearing MULTI-METER and a big 21 INCH TV SET. (D.T.I. offers another home training in Television-Radio-Electronics, but without the TV set.) Mail coupon today for exciting facts.

ABOVE: You build and keep this big 5 INCH commercial-type oscilloscope — one of the most useful test units used in TV today.

Come to D.T.I.'s great CHICAGO LABORATORIES

...one of the Nation's FINEST!

Now, in the heart of the nation's TV Center, you can get all of your preparation in D.T.I.'s big, modern, wonderfully equipped training laboratories. Loads of commercial equipment and ample, well qualified instructors help you get a thorough, practical preparation in the SHORTEST POSSIBLE TIME. Part time student Employment assistance can help you pay your way while in training.

EMPLOYMENT SERVICE

As soon as you complete either the Chicago Laboratory or Home Training, you'll find D.T.I.'s grand Employment Service ready to help you start earning real money. Get full facts. Mail coupon today.

MILITARY SERVICE: If subject to military service, the training information we have for you should prove very helpful. Mail coupon today.

Use 16 mm. MOVIES Only D.T.I. provides you with the loan of visual training movies at home to help you master important basic points faster . . . easier . . . better!

89 WAYS TO EARN MONEY IN TELEVISION RADIO ELECTRONICS

ACT NOW! MAIL COUPON TODAY
Get this publication FREE!

DeFOREST'S TRAINING INC. Dept. PS-4-J
2533 N. ASHLAND AVE., CHICAGO 14, Ill.

I would like your Opportunity News Bulletin showing "89 Ways to Earn Money In Television-Radio-Electronics" also, complete facts about the training opportunity made possible by your organization.

Name _____ Age ____

Address _____ Apt. ____

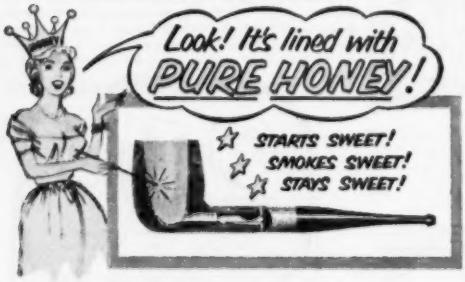
City _____ Zone ____ State ____

"ONE OF AMERICA'S FOREMOST TELEVISION TRAINING CENTERS"
— Established 1931 —

De FOREST'S TRAINING, INC.
AFFILIATED WITH
DeVRY *Technical* INSTITUTE
CHICAGO 14 ILLINOIS

NO TONGUE-STING IN YELLO-BOLE PIPES

Let the Honey Girl show you why



Don't smoke a pipe that tortures your tongue! Light up a Yello-Bole... and *feel* the difference. Thanks to that pure honey lining... you can smoke your Yello-Bole to your tongue's content. No "Break-In Blues!" No stung tongue or irritated throat. Switch to a cool, sweet-smoking Yello-Bole... today!

YELLO-BOLE

$1.00 TO $2.50

WIDE VARIETY OF SHAPES... IMPORTED BRIAR

System, operated by the undergraduates.

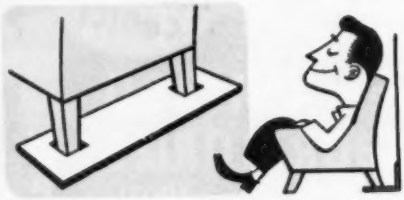
The music of a string trio is picked up by two Altec-Lansing type 21-B condenser microphones placed five feet apart and about 12 feet in front of the performers.

The first announced broadcast took place Nov. 17, 1952, and the programs have been continued every Monday evening at 7:30 p.m. Since WRPI is a campus-limited carrier-current station, the area of the broadcast is only the R.P.I. campus. Those listening to WHAZ at 1330 kc. hear an ordinary broadcast.

JACK ZUSMAN, Brooklyn.

Dr. Brenner's Bumpstopper

When not busy with his duties as head of the Naval Air Station's Dental Dept., Dr. I. E. Brenner, Comdr. (DC), USNR, spends his time inventing things. His latest gim-



mick is the Brenner Bumpstopper, which may be of interest to POPULAR SCIENCE readers.

Working on the principle that if the furniture cannot touch the wall it cannot harm it, the Bumpstopper—made of ⅝-in. scrap plywood—can be readily applied in any home or office.

COMDR. L. B. RIESTER, USNR
U. S. Naval Air Station
Los Alamitos, Calif.

Negative Reaction

Your article "How to Expose Flying Saucers" [Jan. '53, p. 226] was excellent. I'm glad to hear those diffraction gratings are on the market for anyone interested in photographing saucers. But what does the author mean, expose them? I hope he doesn't think they're mirages.

MAX B. MILLER,
Pres., Flying Saucers International
Los Angeles

For one man's opinion, see p. 168.

Model Ts Are Still Climbing

A letter from Carleton Osgood in your November issue [p. 18] claims that in 1925 he drove the last Model T Ford to be al-

TRAIN *FASTER* — TRAIN *BETTER* — TRAIN *EASIER*

IN 10 MONTHS — OR LESS — FOR

RADIO-TELEVISION

Our 21st Year Training Men for Greater Incomes and Security in Radio-Television

I SEND YOU
18 BIG KITS
of Radio Television parts and equipment. Much of your training will be actual construction and experimentation . . . the kind of truly PRACTICAL instruction that prepares you for your Radio-Television career.

Frank L. Sprayberry
President
Sprayberry Academy of Radio

NEW! NO OBLIGATION PLAN

You Have No Monthly Payment Contract to Sign
Pay For Your Training as You Earn and Learn

You can get into Radio-Television, today's fastest growing big money opportunity field, in *months* instead of years! My completely new "package unit" training plan prepares you in as little as 10 months or even less! *No monthly payment contract to sign—thus NO RISK to you!* This is America's finest, most complete, practical training—gets you ready to handle any practical job in the booming Radio-Television industry. Start your own profitable Radio-Television shop . . . or accept a good paying job. I have trained hundreds of successful Radio-Television technicians during the past 21 years—and stand ready to train you, even if you have no previous experience! Mail coupon and get all the facts — FREE!

Valuable Equipment Included With Training

The new Sprayberry "package" plan includes many big kits of genuine, professional Radio-Television equipment. You perform over 300 demonstrations, experiments and construction projects. You build a powerful 6-tube 2-band radio set, multi-range test meter, signal generator, signal tracer, many other projects. All equipment and lessons are *yours to keep* . . . you have practically everything you need to set up your own profitable Radio-Television service shop.

Earn Extra Money While You Learn!

All your 10 months of training is IN YOUR HOME in spare hours. Keep on with your present job and income while learning. With each training "package" unit, you receive extra plans and "Business Builder" ideas for spare time Radio-Television jobs. New television stations everywhere, open vast new opportunities for trained Radio-Television Technicians—and those in training. If you expect to be in the armed forces later, there is no better preparation than practical Sprayberry Radio-Television training.

YOU BUILD the Television set and the powerful superhet radio receiver shown above IN ADDITION to the other test units shown here. (Many are not illustrated.)

SPRAYBERRY ACADEMY OF RADIO 111 NORTH CANAL ST. Dept. 55-V Chicago 6, Ill.

MAIL COUPON TODAY! NO OBLIGATION

I invite you to get all the facts —

FREE **TO YOU 3 BIG** RADIO-TELEVISION BOOKS

Rush coupon for my three big Radio-Television books: "How to Make Money in Radio-Television," PLUS my new illustrated Television Bulletin PLUS an actual sample Sprayberry Lesson —ALL FREE. No obligation and no salesman will call. Mail coupon NOW!

SPRAYBERRY ACADEMY OF RADIO, Dept. 55 V
111 North Canal St., Chicago 6, Ill.

Please rush to me all information on your 10-MONTH Radio-Television Training Plan. I understand this does not obligate me and that no salesman will call upon me. Be sure to include 3 books FREE.

Name..... Age.....

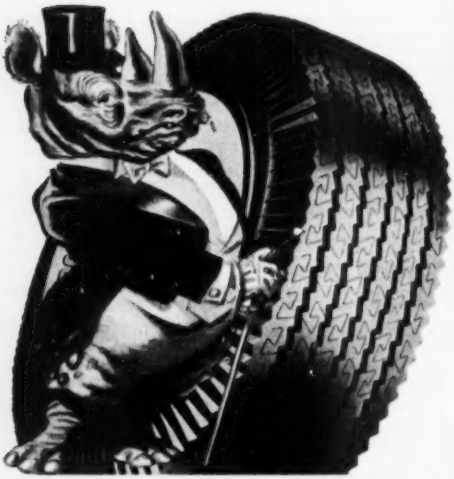
Address.....

City..... Zone..... State.....

Quietest Tread on Earth...
Outgrips, Outwears them all!

ARMSTRONG
Rhino Flex
PREMIUM

● **FOUR EXCLUSIVES** give you safety, silence, comfort found in no other tire. **(1) Interlocking Safety Tread** for greater "hold" in *all* directions. **(2) Silent Traction Design** cancels out hum and sing for world's quietest ride. **(3) Intra-Tread Bumpers** hold tread ribs apart . . . muffle squeal. **(4) Uni-Cushion Contour**—more rubber on road for smoother riding, longer wear.



Unconditionally Guaranteed 3 Years!
Unserviceable tire will be replaced by comparable new tire with full credit for the period of guarantee not realized.

ARMSTRONG RUBBER COMPANY, West Haven 16, Conn.; Norwalk, Conn.; Natchez, Miss.; Des Moines, Iowa; 601 Second Street, San Francisco, Calif. Export Division: 20 East 50th Street, New York 22, N.Y.

lowed up Mt. Washington. I know of at least one that has been up since then.

On Sept. 20, 1947, accompanied by Col. John F. Brown of Lakeport, N. H., I climbed to the clouds in a 1912 Model T touring car. Being with the Glidden Tour Revival of 1947, we were granted special permission to climb the mountain. We ascended the eight miles in an hour and 14 minutes, stopping only to fill the radiator.

WESLEY E. ELDRIDGE, West Ossipee, N. H.

. . . I may not even be the last one myself but I'm sure Mr. Osgood wasn't either. I drove up the mountain in my 1926 Model T on Oct. 10, 1948, and again on Sept. 4, 1949.

AIME BELVAL, Sutton, Vt.

PSM Trailer Tours U.S.

Back in 1946, after reading an article in your March and April issues, I built my own Wanderbug Trailer. The delay in expressing my thanks has only deepened my appreciation, for nothing I have ever owned or used has given me any greater pleasure.

My wife and I (and our daughter, until she married two years ago) make a vacation trip in it each year to different points in the U. S. Enclosed is a snapshot made on a recent trip to Florida.

J. B. REGAN, Fountain City, Tenn.

Electric Whaling Proposed in 1924

I was vastly astonished when I spotted your cover on the January issue and the story, "Whalers Adopt New Electric Harpoon." I wrote a magazine article in 1924 proposing substantially the same idea. I think my idea is still better, where I stated in the article: ". . . The current is not turned on until the harpoon has actually struck the whale."

HUGO GERNSBACK
Editor, Radio-Electronics, NYC.

BOOST YOUR **EARNING** POWER DURING THE **HOURS** THAT **COUNT**

"Every hour I spent on my I. C. S. Course has been worth $95.00 to me! My position, my $7,000 a year income, my home, my family's happiness—I owe it to spare-time training with I. C. S."

EVERY MAIL brings letters like this from men and women who studied I. C. S. courses in their spare time.

What are *you* doing with the hours after supper? Can you afford to let them slip by unimproved when you can easily make them mean so much?

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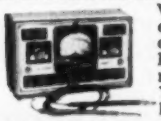

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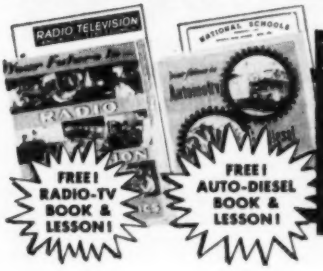

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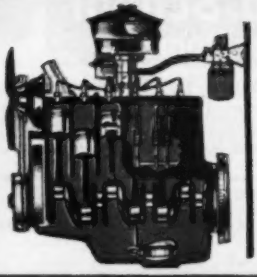

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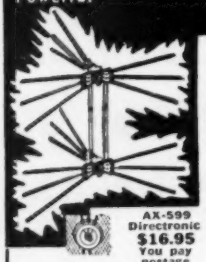

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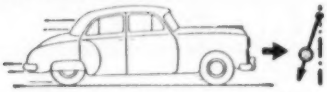
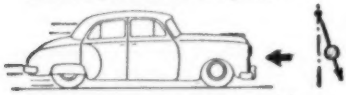


Step on the gas, the pendulum swings backward. The amount it moves indicates car performance and power.



Step on the brakes, the pendulum swings forward. The amount it moves precisely indicates condition of brakes.

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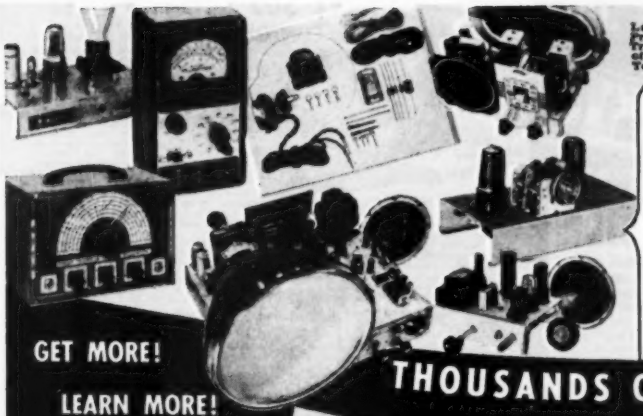

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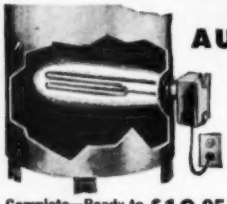

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THE TRUTH ABOUT YOUR TV SET

It is a known fact that your TV antenna not only picks up the picture waves you see on your screen, but also picks up electric static waves that can ruin your picture.

THE REAL CAUSES OF TV INTERFERENCE

And the reason you or your repairman have never been able to block out this interference is because it does not come from within your TV set *but from sources outside your TV set!* These sources are the real cause of TV interference. These are what may cause your TV screen to flicker, flutter, streak or get hazy.

For instance, you yourself, realize that a doctor's diathermy machine up to 2½ miles from your home can ruin your TV viewing pleasure for hours on end.

But do you know that a car or truck passing your home can streak, distort your TV picture?

Do you know that nearby telephone lines or neon advertising signs, can make your screen flicker and flutter?

And do you know that any electrical appliance in your home—or your neighbor's home—can streak, distort and haze your TV picture for an entire evening?

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Trains	Doctor's diathermy machine
Hospital machines	Subways
Electric cash register	FM Radio interference

WHICH OF THESE TV HEADACHES DO YOU WANT TO STOP—IN JUST 45 SECONDS!

STREAKS caused by cars, trains, subways, cash registers, electrical appliances can be BLOCKED OUT by TELERON before it reaches your set.

WEAK PICTURE—TELERON CLARIFIES weak signal. Helps to hold picture bright and steady.

WAVY LINES caused by "Hams," FM broadcast stations, other TV sets, antennas, can be BLOCKED OUT by TELERON before it reaches your set.

FADED PICTURE due to weak, static ridden signals can be CLARIFIED by TELERON before it reaches your set.

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TV STATIC caused by telephone lines, neon signs, atmospheric conditions, can be BLOCKED OUT by TELERON, before it reaches your set.

HOW TO STOP TV INTERFERENCE IN JUST 45 SECONDS!

The only way to eliminate TV interference is to BLOCK IT OUT, before it reaches your set—in exactly the same way sunlight glare is blocked out by sunglasses before it reaches your eyes.

1. You can install an antenna-filter to help reduce interference seeping through your antenna, BUT IT CANNOT STOP streaks, wavy lines or TV static due to interference pouring in through your wall socket.

2. Or you can fix your set yourself in just 45 seconds simply by clipping onto your set a new double protection filter circuit and power line plug that not only blocks out interference coming in through your antenna, but also blocks out interference coming through your wall socket. The name of this amazing invention is the TELERON INTERFERENCE TRAP which actually blocks out these interference waves before they reach your set.

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Simply clip the TELERON INTERFERENCE TRAP on to your set. It takes only 45 seconds —and fits every set made since 1947, regardless of make, model or year. See for yourself how this amazing invention gives you sharp, clear pictures; how it can add new life to your picture even in fringe areas—even in weak reception zones—even on channels you could hardly pick up before!

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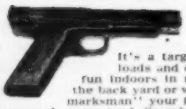

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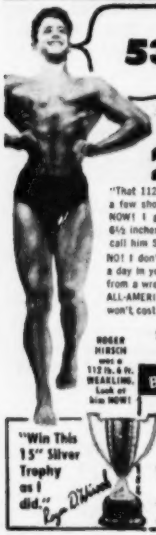

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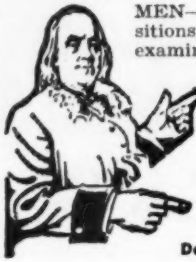

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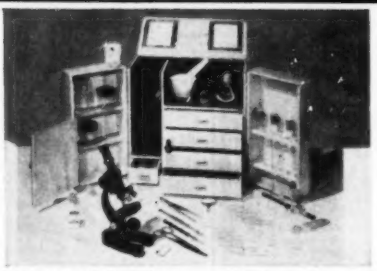

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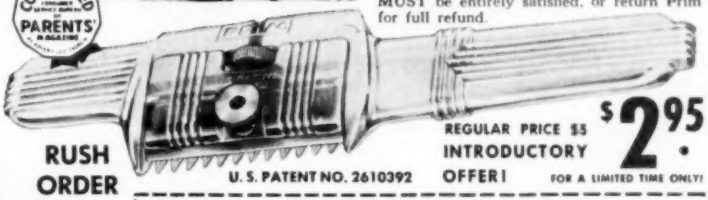

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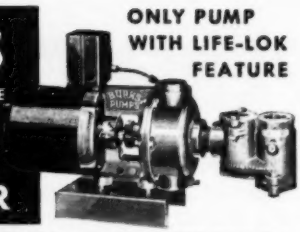

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650-16(6)	7.92	670-15	5.22	750-18	9.62	750-20(10)	17.52
700-16	6.52	710-15	5.72	750-15	13.22	825-20	18.22
700-16(6)	8.72	760-15	5.92	750-17	13.92	900-20	17.22
750-16	7.02	800-15	6.62	700-18	15.82	1000-20	18.52
550-17	4.52	820-15	6.72	600-20	8.72	1100-20	18.52
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650x16(6)	6.75	710x15	5.65	750x17	10.65	825x20	18.15
700x16	6.45	760x15	5.85	750x15	10.55	900x20	17.15
750x16	6.95	800x15	6.75	825x15	11.95	1000x20	18.35
525x18	4.85	820x15	6.65	600x20	8.65	1100x20	18.35
550x17	4.45	670x16	6.15	650x20	10.65	1000x22	17.35
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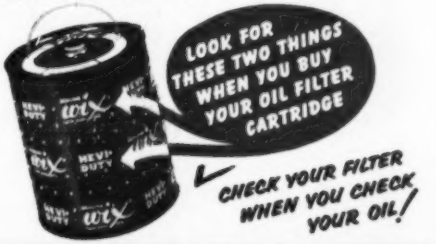

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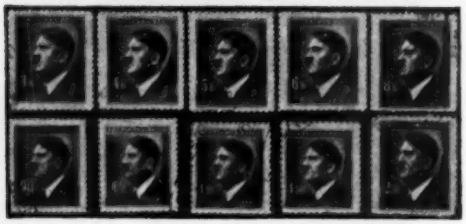

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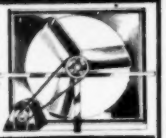

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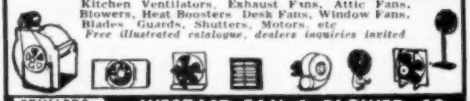

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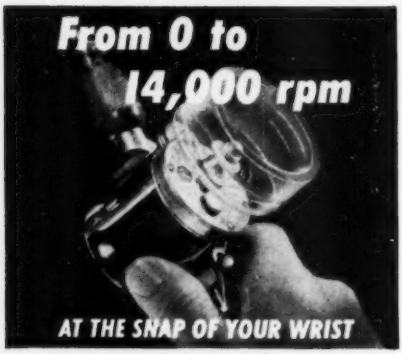

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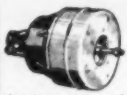

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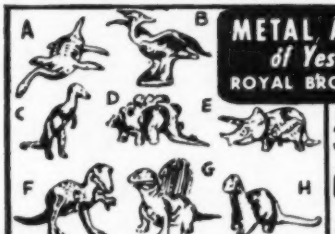

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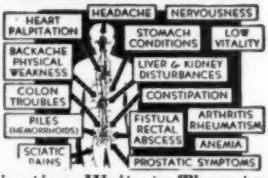

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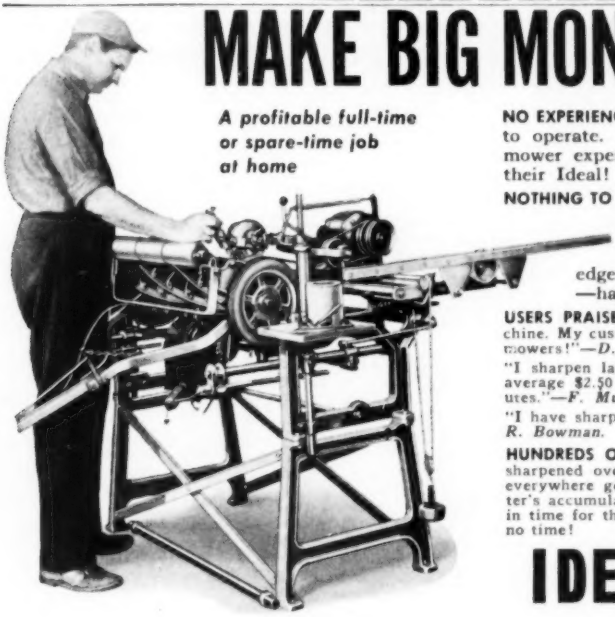

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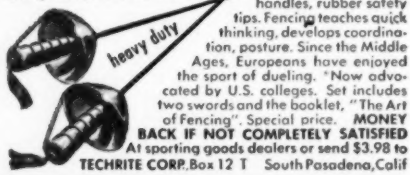

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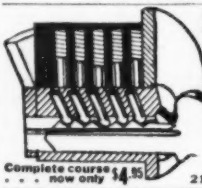

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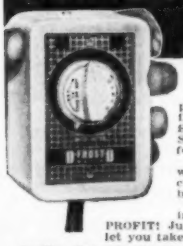

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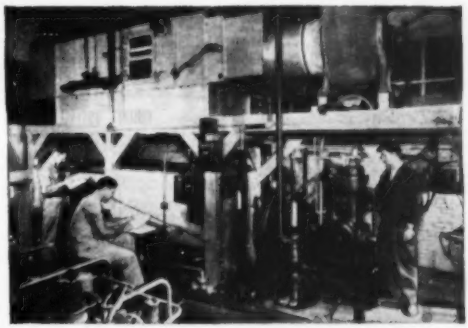

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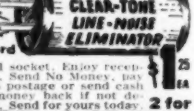

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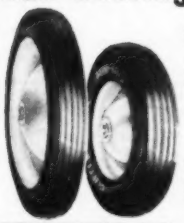

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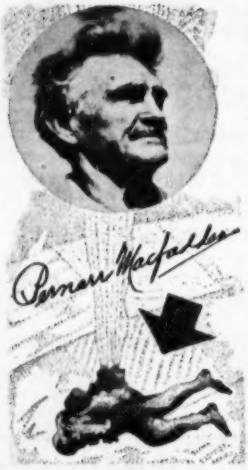

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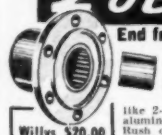

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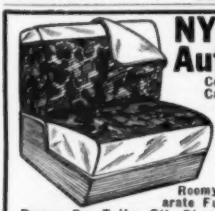

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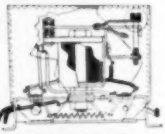

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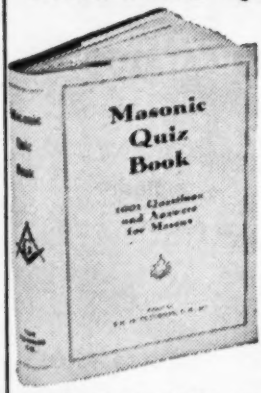

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750x16	12.50	710x15	6.50	32x6(8)	11.95	1000x22	19.50
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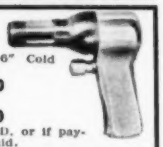

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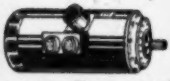

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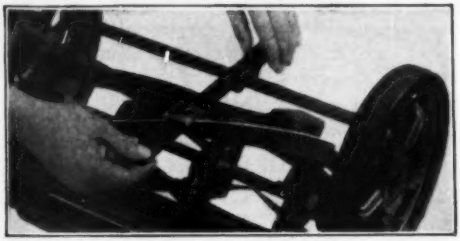

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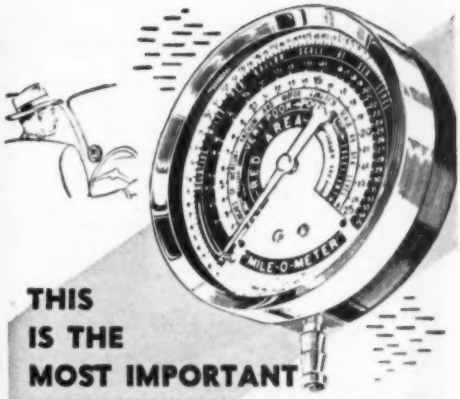

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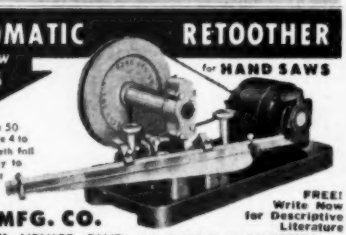

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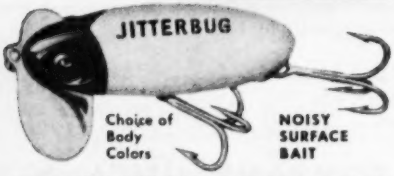

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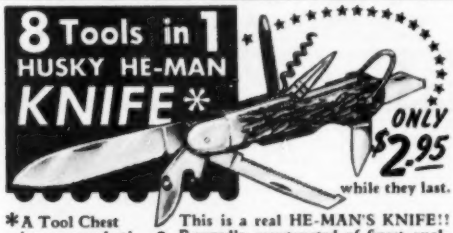

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#2 . . . Photographing Children

BY WEEGEE

Weegee, the world's foremost flash photographer. Author of NAKED CITY and NAKED HOLLYWOOD

Every photographer is entitled to one pet peeve. Mine is baby pictures. They all look alike—stiff and mechanical like puppets on a string. Yet often hours and even days are wasted posing baby. And it's so unnecessary. When shooting baby pictures, I make a schedule of the child's routine.

Using the schedule, I know when I can take natural looking feeding pictures, realistic bath shots, and true-to-life outdoor photos. If you stick to the baby's regular schedule, every child is enough of a ham to give you all the cute photos you want. What's more, the schedule enables you to plan your shots, and get the effects you want without wasting film or time posing artificially.

There's more about photographing babies in my new booklet WEEGEE'S SECRETS OF SHOOTING WITH PHOTOFLASH. This 64 page booklet is not sold at any store. But you can get a copy by sending 25¢ and the wrapper from a carton of Westinghouse Photoflash Bulbs to Westinghouse.

Here is another point to keep in mind, whether you own a box, candid or press camera. In 20 years I've tried all brands of flash bulbs. And you just can't beat Westinghouse bulbs for dependability. I shot all of my new book — NAKED HOLLYWOOD with Westinghouse Flash Bulbs and never found a single dud. Try a carton of Westinghouse bulbs on my say so. You won't be sorry.

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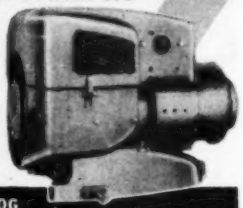

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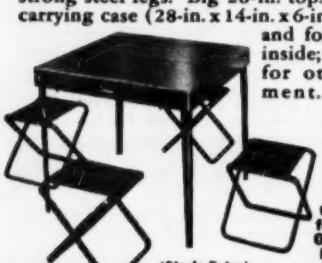

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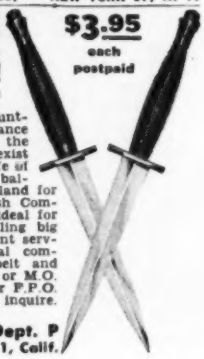

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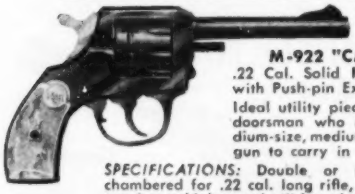

M-922 "CAMPER"

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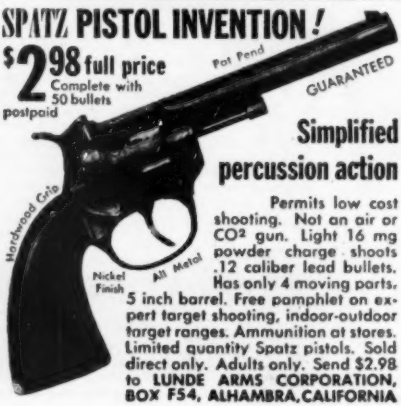

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transistor—

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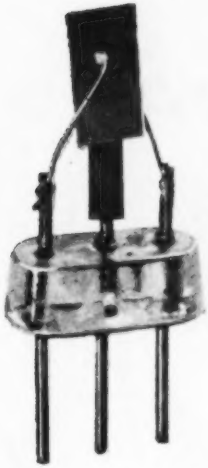

Because of growing public interest in transistors, RCA—a pioneer in their development for practical use in electronics—answers some basic questions:

Q: ***What is a transistor?***

A: The transistor consists of a small particle of the metal germanium imbedded in a plastic shell about the size of a kernel of corn. It controls electrons in solids in much the same way that the electron tube handles electrons in a vacuum. But transistors are not interchangeable with tubes in the sense that a tube can be removed from a radio or television set and a transistor substituted. New circuits as well as new components are needed.

Q: ***What is germanium?***

A: Germanium is a metal midway between gold and platinum in cost, but a penny or two will buy the amount needed for one transistor. Germanium is one of the basic elements found in coal and certain ores. When painstakingly prepared, it has unusual electrical characteristics which enable a transistor to detect, amplify and oscillate as does an electron tube.

Q: ***What are the advantages of transistors?***

A: They have no heated filament, require no warm-up, and use little power. They are rugged, shock-resistant and unaffected by dampness. They have long life. These qualities offer great opportunities for the miniaturization, simplification, and refinement of many types of electronic equipment.

Q: ***What is the present status of transistors?***

A: There are a number of types, most still in the development stage. RCA has demonstrated to 200 electronics firms—plus Armed Forces representatives—how transistors could be used in many different applications.

Q: ***How widely will the transistor be used in the future?***

A: To indicate future applications, RCA scientists have demonstrated *experimental* transistorized amplifiers, phonographs, radio receivers (AM, FM, and automobile), tiny transmitters, electronic computers and a number of television circuits. Because of its physical characteristics, the transistor qualifies superbly for use in lightweight, portable instruments.

* * *

RCA scientists, research men and engineers, aided by increased laboratory facilities, have intensified their work in the field of transistors. The multiplicity of new applications in both military and commercial fields is being studied. Already the transistor gives evidence that it will greatly extend the base of the electronics art into many new fields of science, commerce and industry. Such pioneering assures finer performance from any product or service trade-marked RCA and RCA Victor.

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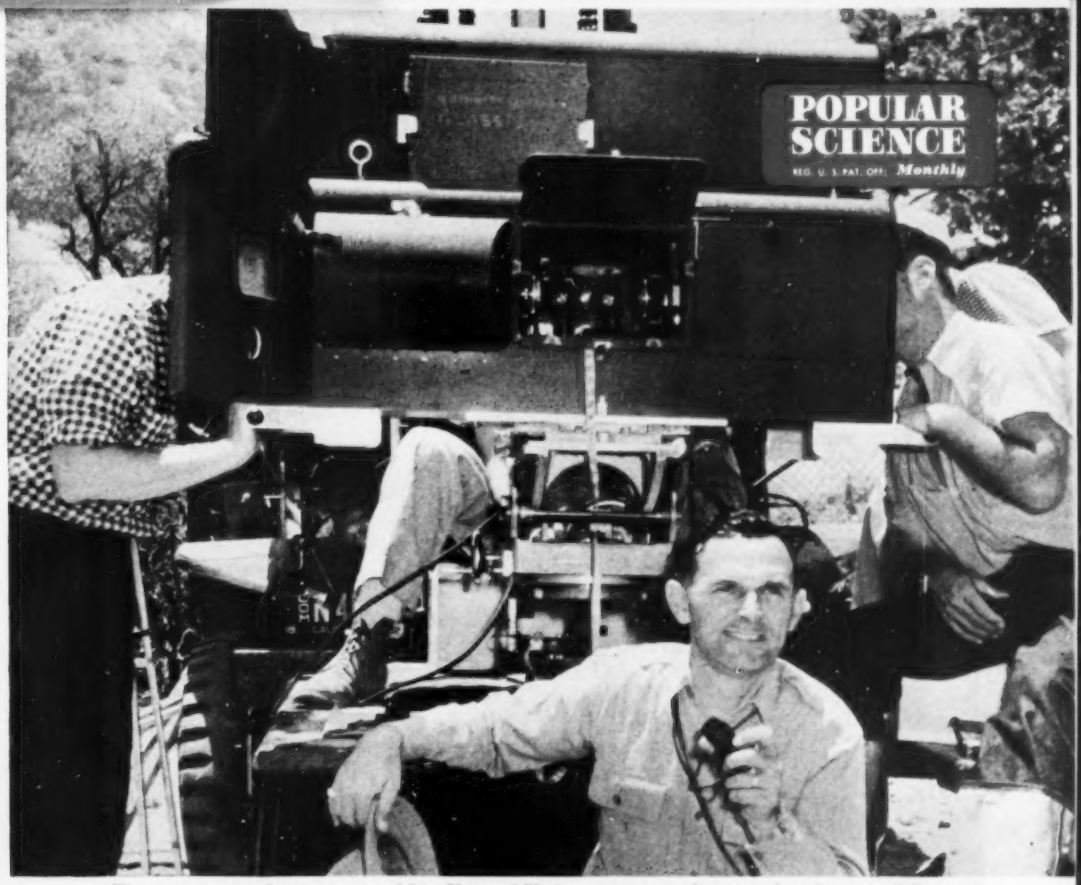


Five-man crew clusters around big Natural Vision camera to line up shot for new 3-D movie.

How They Make Movies Leap at You

Hollywood now challenges TV with a rush to three-dimensional films that add lifelike depth to scenes of exciting action.

DON'T be surprised if tomorrow's film comedian steps out of the silver screen to remove the bonnet of the gal in the 13th row—the one who shuts off your 3-D view of Marilyn Monroe.

3-D is "Hollywood" for three-dimension movies—the exciting entertainment medium which catapults drama and action from a giant picture frame to the very heart of a flicker palace. The success of experimental 3-Ds in winning customers away from TV has set off a stampede in the industry. One major studio—20th Century Fox—has announced that it will make *all* future films that way.

Adding a third dimension to motion

pictures is old stuff. In 1924, stereoscopic films that used separate but overlapping images were shown. Audiences wore spectacles with red and green filters to separate the images. What they saw were true 3-D pictures. Unfortunately, their enthusiasm was dampened by headaches and nausea.

Then came Polaroid stereoscopy, which substituted colorless, light-polarizing filters for the red and green eyepieces. Polarized images eliminated eyestrain. They also made 3-D color movies possible.

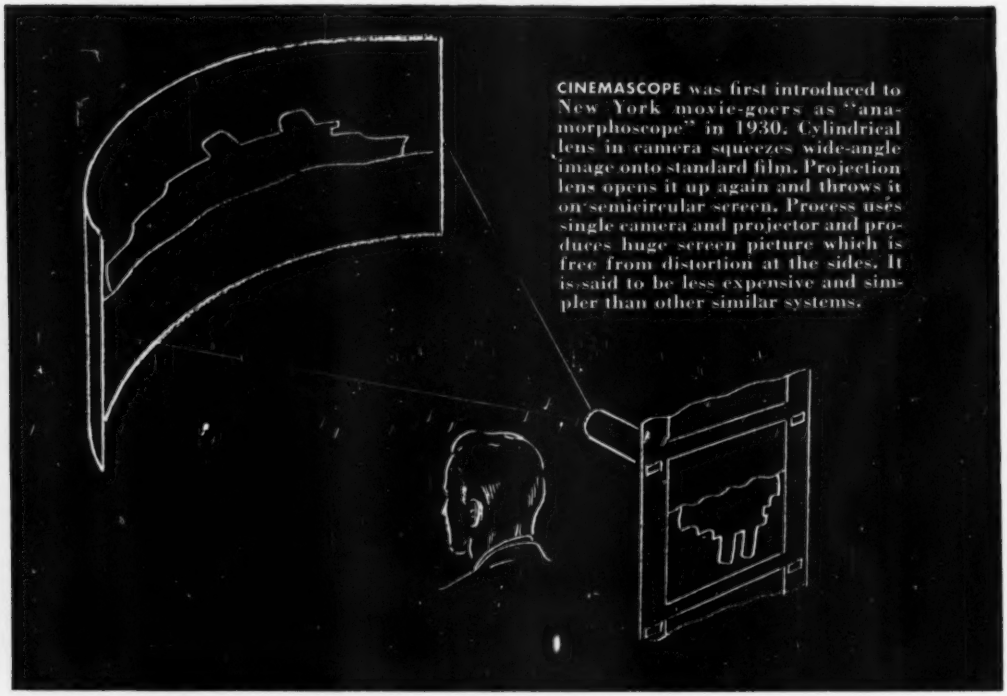
All 3-D Systems Are Pretty Much Alike

In the months to come you will hear a lot about "Stereo-Cine," "Natural Vision," and "Paravision." Don't be confused. All of them are prettied-up names for Polaroid stereoscopy. The only difference is in the types of camera and in the projector used.

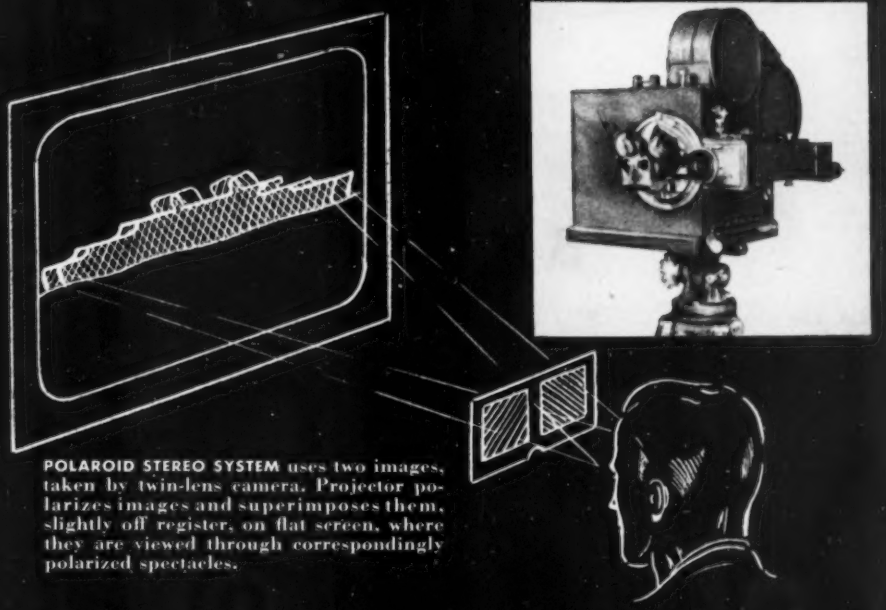
One system calls for two cameras and projectors to produce a double image with two films. Another uses a single camera with twin lenses, two films and a twin-lens projector. A third places the two images, side by side, on a single film.

Stereo movies call for a whole new set of studio techniques. Sudden changes from distant shots to close-ups are annoying to viewers, and must be tied together with some sort of transition view. By using incorrect focusing, it is possible to bring objects "ahead" of the screen, giving them the appearance of floating in space. The illusion is dramatic, and can be used effectively in close-ups.

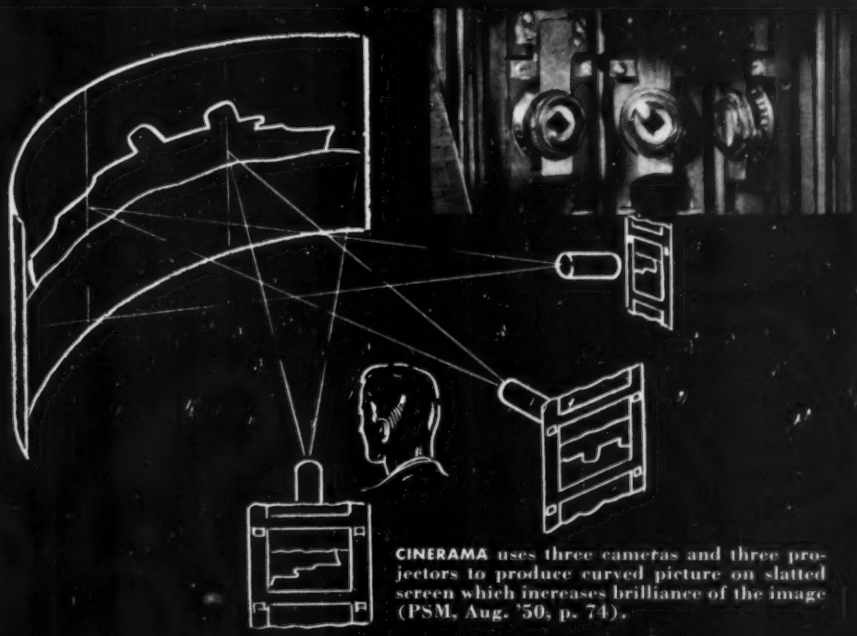
In competition with stereo are Cinerama and Cinemascope. Both use extra-wide, curved screens to engulf the audience. Technically, these are not true 3-D —they do not supply two separate images to the viewer's eyes. But the tremendous pictures, seen partly out of the corner of the eye, create a convincing, three-dimensional effect. END



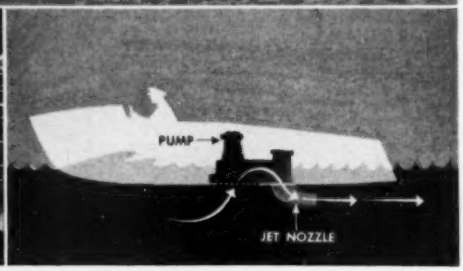
CINEMASCOPE was first introduced to New York movie-goers as "anamorphoscope" in 1930. Cylindrical lens in camera squeezes wide-angle image onto standard film. Projection lens opens it up again and throws it on semicircular screen. Process uses single camera and projector and produces huge screen picture which is free from distortion at the sides. It is said to be less expensive and simpler than other similar systems.



POLAROID STEREO SYSTEM uses two images, taken by twin-lens camera. Projector polarizes images and superimposes them, slightly off register, on flat screen, where they are viewed through correspondingly polarized spectacles.



CINERAMA uses three cameras and three projectors to produce curved picture on slatted screen which increases brilliance of the image (PSM, Aug. '50, p. 74).



High-Speed Water Jet Drives Pleasure Boats Now

STARTING next month, you'll be able to drive your boat with the latest in marine propulsion—Hydrojet. That's the device that pushes by squirting a high-speed jet of water astern (PSM, Feb. '50, p. 129). Used experimentally on armed forces craft, it's now coming on the market combined with a Kermath 60-horsepower Sea Jeep engine. The rig, said to match a prop with a light load and beat it with a heavy one, will drive a 17-foot boat at better than 20 m.p.h.

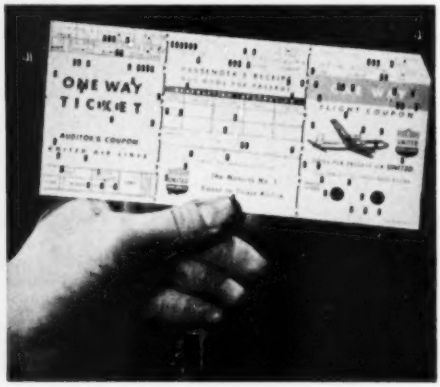
Rotating the jet stream stops a boat dead in its tracks or turns it in its own length at full speed. Because there is no projecting prop, a boat can run in extremely shallow water or amid floating debris.

Scooter to Tote Farm Loads

THIS three-wheel cargo scooter, powered by a two-cycle engine, can chug along hauling as much as 440 pounds of goods in the little van at the rear. A German scooter, the Goggo is priced at 1,900 marks (about $425). The maker, Isaria-Maschinenfabrik of Dingolfing, Bavaria, exhibited it at a recent West Berlin agricultural show to suggest a cheap form of transportation and cartage for farmers.

New Air Ticket Cuts Waiting

PLANE tickets punched out by machine are replacing handwritten flight coupons to speed up the ticket line. Fare, tax, origin and destination are chopped out; only the passenger's name and the flight data are written in. One-way ticket below has three parts: one for the agent, one for the plane stewardess and a passenger's receipt. For a fast audit, United Air Lines feeds the stubs to electronic IBM machines.



Atomic Firepower vs. Artillery

The A-gun can punch like 4,000 Long Toms, but you still need a conventional army to make the enemy give you an A-target.

More tests of atomic weapons were being arranged at the Las Vegas (Nev.) Proving Ground as this issue of POPULAR SCIENCE MONTHLY *went to press. Twenty nuclear devices were detonated there in 1951 and 1952. What is the significance of such tests to a commander and troops on a battlefield? How will atomic weapons strengthen them? The article which follows is a well-known atomic scientist's answer to these questions.*

By Ralph E. Lapp

ESSENTIALLY, the Nevada tests are paving the way for a family of atomic weapons ranging from an aircraft bomb which can be used in tactical aircraft to one which could be fitted as a warhead to a guided missile. In this family of weapons the prototype of an atomic artillery shell has been tested.

Such tests have shown that:

- The size and weight of the A-bomb has been significantly reduced. But talk of baby A-bombs or atomic hand gre-

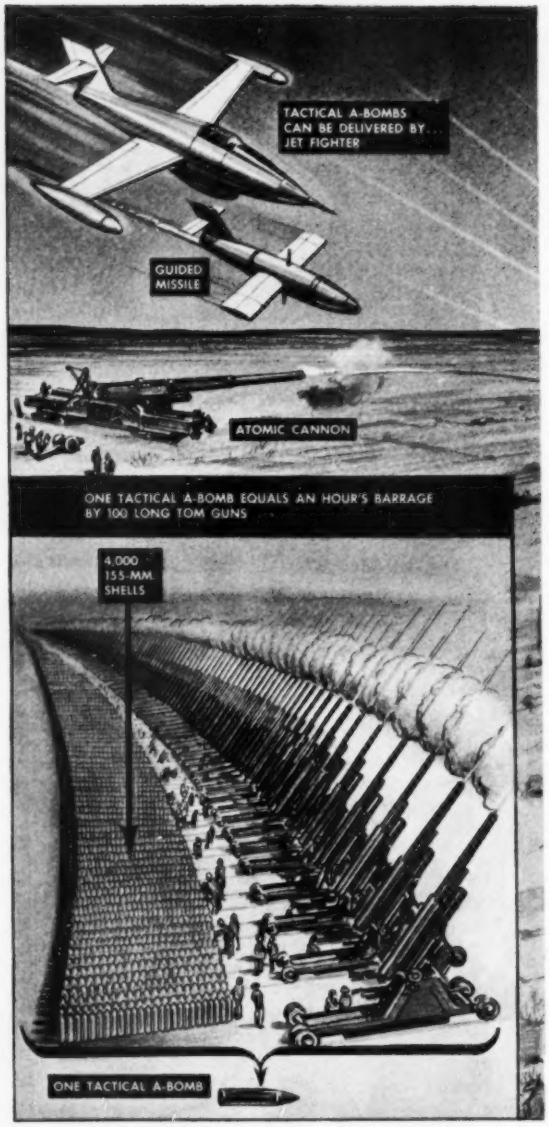
nades still belongs in the realm of science fiction.

• Smaller atomic explosions, less than the equivalent of 20,000 tons of TNT, have been produced. But detonations must still be measured in terms of thousands of tons of TNT.

• Making the bomb smaller involves a definite loss in efficiency or in the percentage burn-up of uranium in the bomb. A very small bomb for firing in an artillery piece is not as efficient as a larger bomb dropped from an airplane.

The atomic howitzer weighs 85 tons. Its dinosaur proportions make it a standout target for enemy counteraction. However, it can project a shell more than 15 miles with quite high accuracy. This will be of value against massive concrete fortifications where pinpoint accuracy may be needed even with A-shells.

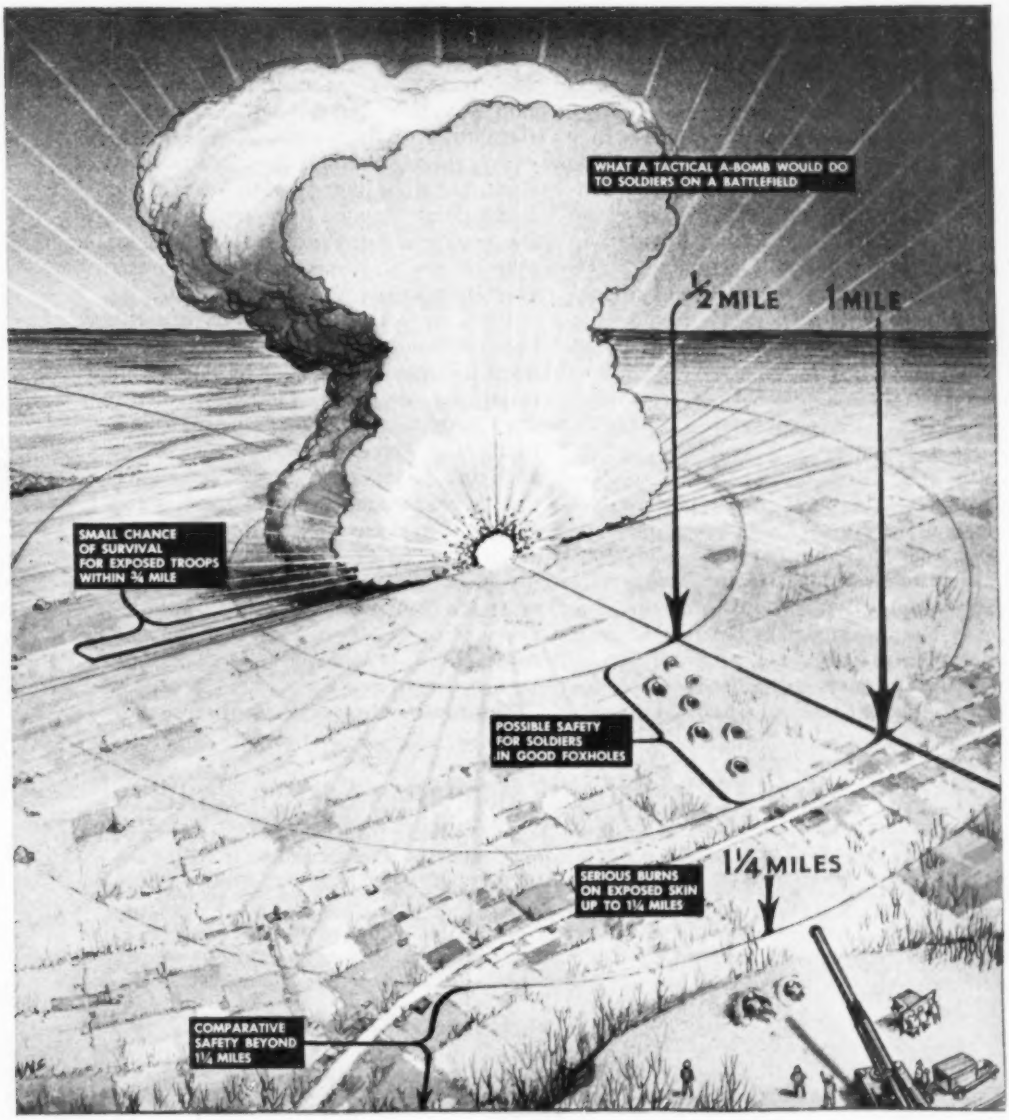
THE AUTHOR of this article was a division director of the famous Manhattan project that built the first atom bomb. After the war he held a series of posts concerned with scientific research for the armed forces. At present he is in private business as an industrial consultant. This article is condensed from a chapter of his latest book, The New Force, *copyright 1953, by Ralph Eugene Lapp (Harper, $3). The drawings at right illustrate Dr. Lapp's conclusions.*



Deadly Action Covers Big Area

The A-gun can fire in any kind of weather when aircraft might be grounded and be unable to deliver the required A-weapon. Its accuracy is important because the large radius of lethal action of the A-explosive might overlap friendly troop positions if good accuracy in delivery were not achieved. Finally, the A-gun can be used even if the enemy has command of the air. Air Force officers dispute the latter claim since they feel that the A-gun is an easy target for enemy aircraft.

Although A-weapons for tactical use come in assorted sizes, it is useful for purposes of discussing the effect of the weapon on the battlefield to fix attention upon a 10 kiloton bomb. That is one which is equivalent to 10,000 tons of TNT or is one half as powerful as the Nagasaki bomb. Specifying just what damage a 10 kt. A-bomb explosion will do on the battlefield is much more difficult than predicting what the same explosion would do against buildings.



As between people concentrated in a city and soldiers spread out on the battlefield it is clear that in general only the primary heat flash, the first flash of penetrating radiation, and the blast wave may be effective in causing battlefield casualties. Soldiers close in when the A-bomb explodes over them, say, within ¾ mile, will have a very small chance of survival if they are standing up in the open—utterly unprotected. Beyond this distance an unprotected soldier would have increasing chance of escaping harm up to a distance of 1¼ miles where he would be safe, especially if he ducked and sought cover as he would be trained to do.

As a rule of thumb, anyone in a good foxhole at one mile from the burst would

be quite safe. But, while going underground may enable a soldier to survive even A-bombs, it is no way to win battles. To win, ground soldiers must get out of their foxholes and occupy enemy territory. Once out of the foxhole they are vulnerable to atomic attack. This illustrates the point that use of the A-bomb may require delicate timing on the part of the user if he is to catch an enemy in a vulnerable attitude.

The reader may find it useful to consider that he is a front-line commander responsible for giving the order to use an A-bomb against an enemy attack. Here are the links in the chain of factors which you would have to consider.

Enemy Might Be Too Close

First would be the all-important element of accurate intelligence data. Suppose that you thought the enemy had concentrated a full division along your sector. Before you would think of using an A-bomb you would have to be sure that this was true. Yet, accurate battlefield intelligence, as any veteran of the front lines will tell you, is hard to get.

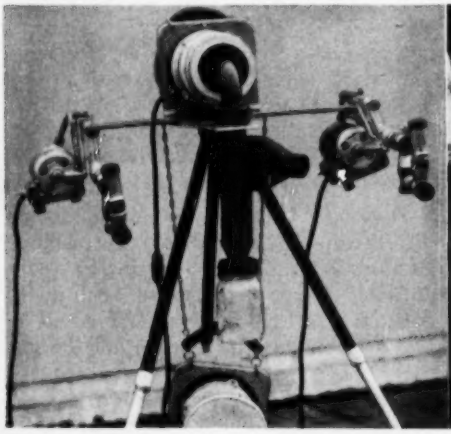
Next, you would have to ask yourself: "Is the target worth an A-bomb?" Naturally, your decision would depend upon such facts as how precarious your position was, how many A-bombs you had, the nature of the terrain, the degree to which the enemy had dug in, and how close his front line was to yours. The latter point may be very significant. If the enemy is too close you may not be able to use a bomb without exposing your own men.

With the decision made to use the bomb, it would be a question of delivering the weapon where you wanted it when you wanted it. Timing would be very important to nip an enemy attack in the bud. Too early an explosion might find the enemy still dug in and protected; too late an attack might find the enemy above ground but too close for proper use of the weapon. This situation points up the Army claim that it must have guaranteed split-second delivery of the weapon. Such delivery, the Army claims, is achieved only via atomic artillery or atomic missiles.

The combination of these three major

How AEC's National Monitoring System Protects

"CHRISTMAS TREE" is used by mobile teams to sample air for radioactive dust after A-bomb test. Dust particles in air pulled through samplers at cross-bar ends are sorted by size. High volume units, center, sample total dust.



DUST SAMPLES ARE RECORDED at New York central office. Dust is shipped in filters or on gummed paper, showing date and point of origin. Mobile teams work up to 500 miles from test point; fixed stations cover U. S.

factors—intelligence, proper target and timing in delivery—adds up to the fact that proper use of the new weapon will require great skill.

The prime significance of the new weapon is that the age-old pattern of massing men to break through enemy defenses is no longer possible or can be undertaken only on a sudden-death-risk basis. Once an enemy concentrates men and material, he is an A-bomb target.

Massed Men Make Good Target

The penalty levied by the tactical atomic weapon can be appreciated by comparing the damage with that produced by massed artillery fire (see chart on page 102).

In the face of such firepower, Army leaders must pore over their battle plans to make sure that no critical point is exposed to the lethal lash of the atom. Concentration of man power or tanks or guns must be avoided.

The alternative to concentration is dispersion. By spreading troops and equipment you present a much poorer target. General Bradley illustrated the point in a Congressional hearing when he stated: "If you did not oppose them the Russians could walk across Europe at 100-yard intervals, and walk all the way to the Channel, and you would never get an A-bomb target."

Invitation to Attack

What this means is that the atom alone cannot stop an attack. Dispersion of an attacking force would neutralize the defensive power if it were based solely on A-weapons. The defense must be doubly armed. It must have conventional strength in soldiers, guns, tanks and planes to turn back a dispersed attack. And it must have atomic striking power to stop a massed attack. The two go hand in hand, for soldiers manning a strong defensive line can force the enemy to concentrate in order to pierce the line. Once concentration occurs then the A-bomb finds its target. Thus the A-bomb becomes a supplementary weapon which depends upon the existence of a strong conventional defense for setting up the enemy into attractive concentrations which invite atomic attack. END

You from Nevada's Radioactive Atomic Dust

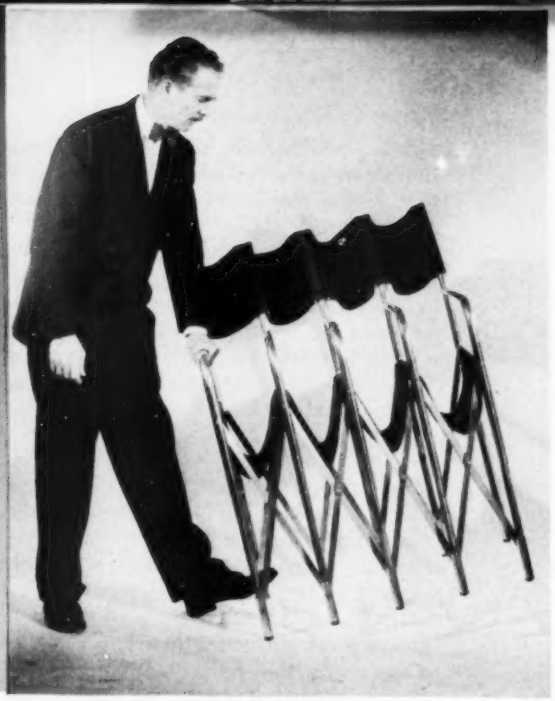
CRUCIBLES **containing folded dust samples are placed in a furnace and samples are reduced to ashes. These are ground up and placed in numbered plastic dishes, which are sealed in rolls of vinyl tapes for measurement.**

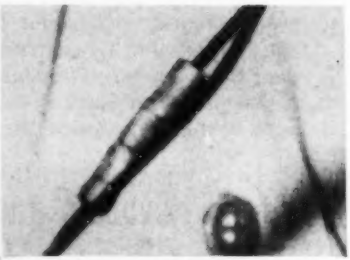
COUNTING APPARATUS **measures radioactivity of each sample for 20 minutes and records result. If mobile teams found radiation reaching hazardous level, local residents would be evacuated. This never has been necessary.**

A Flick of the Wrist Opens Folding Settle

SETTING up or taking down several hundred chairs in an auditorium is a lighter chore with these multiple seats made of aluminum tubing and flameproof duck. As many as seven chairs are obtainable in a line-up.

When folded together accordion-wise, the unit can be carried in one hand. The chairs are opened by pulling forward on the near arm while keeping a steadying foot on the crossbar. Or one man can push them apart by grasping two center arms, then extending his own arms wide. Reversing the procedure folds the unit. The row won't tip even when only the end chair is occupied. Burd Metal Products Co., Clearwater, Fla., makes the Xtenzo.





GI Tool Splices Wire in 30 Seconds

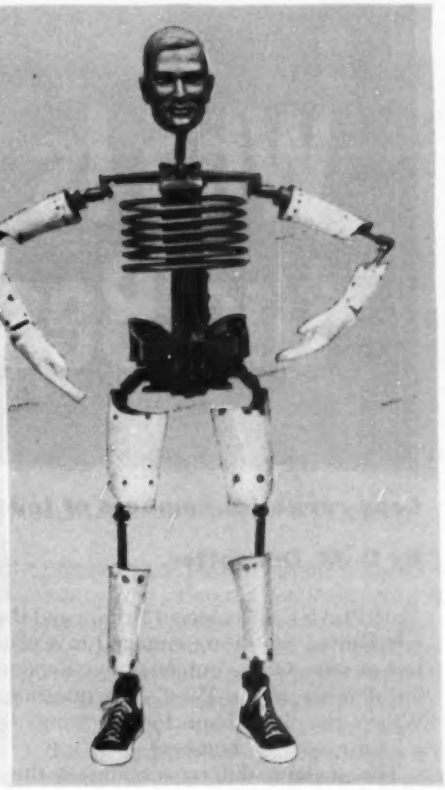
WITH two squeezes of a new plier-shaped tool, a GI wire repairman working under fire can make a perfect splice (above) and scram for cover.

The wire ends are squeezed in a cutter-stripper on the handle, put in a splicing sleeve fed to the jaw end from a trigger-action magazine, and then squeezed again.

Now a 30-second job that can be done with gloves on, it used to take signalmen three to four minutes in good weather to scrape, tie and tape a break. Aircraft-Marine Products, Harrisburg, Pa., makes the tool for the Signal Corps.

Almost Human, He Tests Crashes

ANTHROPOMORPHIC Test Dummy Mark II is his name and he takes a beating all the time, in Navy studies of the effects of crashes, explosions and rocket take-offs. He's a close imitation of a man, with metal bones, foam-rubber flesh and elastic muscles.



Newest wing is the crescent shape of the British Handley-Page Victor.

Who Is Building the Best Bomber?

Long-range jet bombers of today are no better than their wings.

By D. M. Desoutter, *Assistant Editor of the British magazine* Aeronautics.

AIRPLANE designers of Britain and the United States are engaged in a contest of wits. On its outcome may depend the defense of the West. The question: What's the best shape for the wings of a long-range jet bomber?

The striking differences among their latest answers were underscored when the wraps of secrecy were partly removed recently from the newest British bomber —the crescent-wing Handley-Page Victor (PSM, March '53, p. 170). The sketches at the top of these pages show how radically the design of the new Victor

Delta wing of the British Avro Vulcan makes plane look like a triangle.

Sharp sweep back identifies the thin-winged U. S. Boeing B-52 Stratofortress.

But designers disagree as to what shape of wing is the best.

departs from that of the British delta-wing Avro Vulcan and how little both of these planes resemble in external appearance the thin, swept-back wing of the American Boeing B-52 Stratofortress.

Yet all three were designed to do the same job: to fly great distances at altitudes around 50,000 feet and at speeds very close to the speed of sound. These bombers are built to fly at a speed just below that of sound for a very practical reason: To force an enemy to take on the thunderclap hazard of crossing and recrossing the sonic barrier every time he tries to intercept them.

All the designers thus were faced by the same problem—to plan a plane that would fly just below the sonic barrier

SHARP WING SWEEP of U.S. Stratofortress was developed from this B-47 six-jet medium bomber. Boeing claims proper placement of underslung engines prevents tip stalling.

while keeping the drag effects of its wings low enough for long-range flight. Why, then, are they so different?

Look at the Stratofortress. Its wings are long and thin and swept back all the way from root to tip. This shape embodies two of the known cures for Mach trouble—the trouble associated with flight at the speed of sound. These are thinness and sweep back. Both enable the wing to cut through the air with a minimum of disturbance. This is critical at high subsonic speeds where air resistance rises rapidly and some of the air flowing over the wing, forced out of a straight-line course, will be supersonic. Thinness cuts drag.

Thickness-to-Chord Ratio Counts

Sweeping back the wing reduces drag, too, by delaying the onset of shock-wave turbulence connected with transonic flight. In effect, flying at the brink of the sonic barrier, the air flow over a swept-back wing behaves as smoothly as it would in flight at a much lower speed.

Now look at the delta wing of the Vulcan. That, too, has sweep back all the way along the leading edges of the wing. But it is a much thicker wing than that of the Stratofortress. Indeed, it is so thick that its four engines, each about 40 inches in diameter, are buried inside it.

The important distinction, however, is not between the actual thickness of the wings, but in their *thickness-to-chord ratios.* To grasp this, imagine a section cut through each wing from front to rear. You can then see that the Vulcan's wing is not, relatively, so thick. In relation to its fore and aft length (the chord) the section is quite thin.

Although the dimensions of this bomber are secret, it is possible to say that the chord of the wing at the part where the engines are buried is at least 50 feet. And the engines themselves are 3½ feet in diameter. So the wing section is more than 12 times as long as it is thick. Since this relationship is maintained all the way out to the tip, the Vulcan, like the Stratofortress, makes use of both sweep and thinness over the whole wing area.

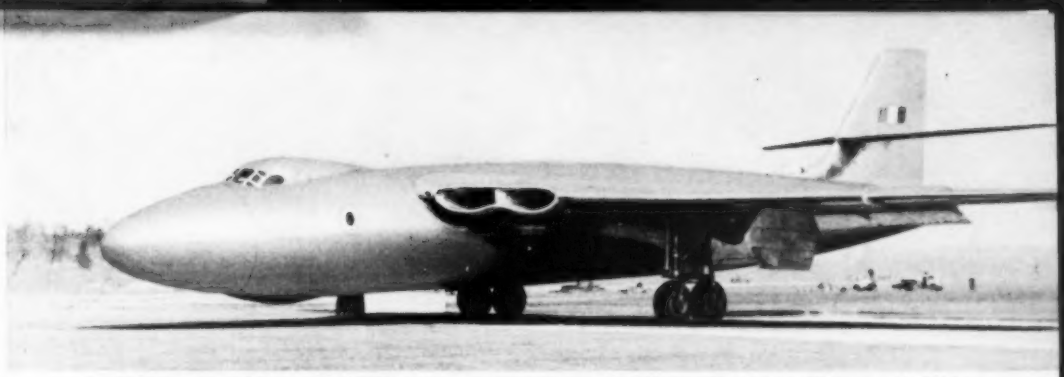
The important difference is that the Vulcan has its engines buried in its wings, and the landing gear too, together with most of its fuel tanks. The U. S. Stratofortress, on the other hand, has its eight engines hung in pods outside the thin wing and carries its landing gear in the fuselage.

Sharp Sweep Back Stops Drag

Now consider the newest British bomber, the Victor, with its crescent, or scimitar-shaped wing. As in the Vulcan, the engines are housed inside the wing near its root, where it connects to the fuselage.

In the Victor, sharp sweep back saves the thick root section of the wings from causing a serious rise in drag when flying near the speed of sound. Because the chord is less than that of the Vulcan's triangular wing, the Victor's is relatively thicker—though probably of almost the same thickness in inches, since the engines of each are of almost exactly the same diameter.

Unlike the Stratofortress wing, the crescent wing does not maintain this



BRITISH use plain swept-back wing, too, as shown in this Vickers Valiant four-jet medium bomber. As in the Victor and Vulcan, engines are buried in wing for less drag.

angle of sweep over its whole length. The wing is, instead, divided into three parts, each with its own sweep angle; and as the sweep becomes less toward the tips, so the sections become thinner.

Thus the Victor may be compared with the other two bombers by saying that it uses *either* sweep *or* thinness, where they use *both*. The purpose behind the design is to reduce the sweep near the tips until it is almost nonexistent. This avoids a peculiar disadvantage of swept wings—tip stalling. On long swept wings, the air tends to flow outward along the wing, accelerating toward the tip and leading to premature stalling there.

The crescent, while avoiding tip stall, still maintains a fairly high aspect ratio—that is, ratio between wing span and chord. For years, designers have held to high-aspect-ratio wings for economical long-distance cruising, because long, narrow wings of this kind work efficiently and with little drag.

Low Wing Loading Helps

The stubby delta wing of the Vulcan seems to miss a point here by comparison with the Victor and the medium-aspect Stratofortress. But there is another solution to the problem—the use of a low wing loading. When a large wing area is used to lift a given weight, it can do it more easily and with less drag than a highly loaded wing. This is especially so in the thin air of very high altitudes, say the Vulcan's designers.

The delta also gains a good deal by eliminating the weight and complication of a horizontal stabilizer at the tail. The delta does, however, have a large wing area, creating air drag by friction.

BELL X-5 RESEARCH AIRPLANE can vary sweep angle of its wings in flight, as shown in this multiple-exposure photograph, to study effects of sweep back at high subsonic speeds.

Even today's latest designs are not likely to be the final answer. The ideal solution to the drag problem, for instance, might be no wings at all. In fact, one U. S. aeronautical engineer seriously suggests an airplane with retractable wings. These wings would be extended only to give lift for take-offs and landings, while at high speeds the plane would skim through the air on its fuselage. END

Crow's Nest on Hydraulic Boom Gives TV Camera High View

FROM a crow's nest at the tip of a hydraulic boom, TV cameramen and commentators get a clear view over the heads of crowds at news events.

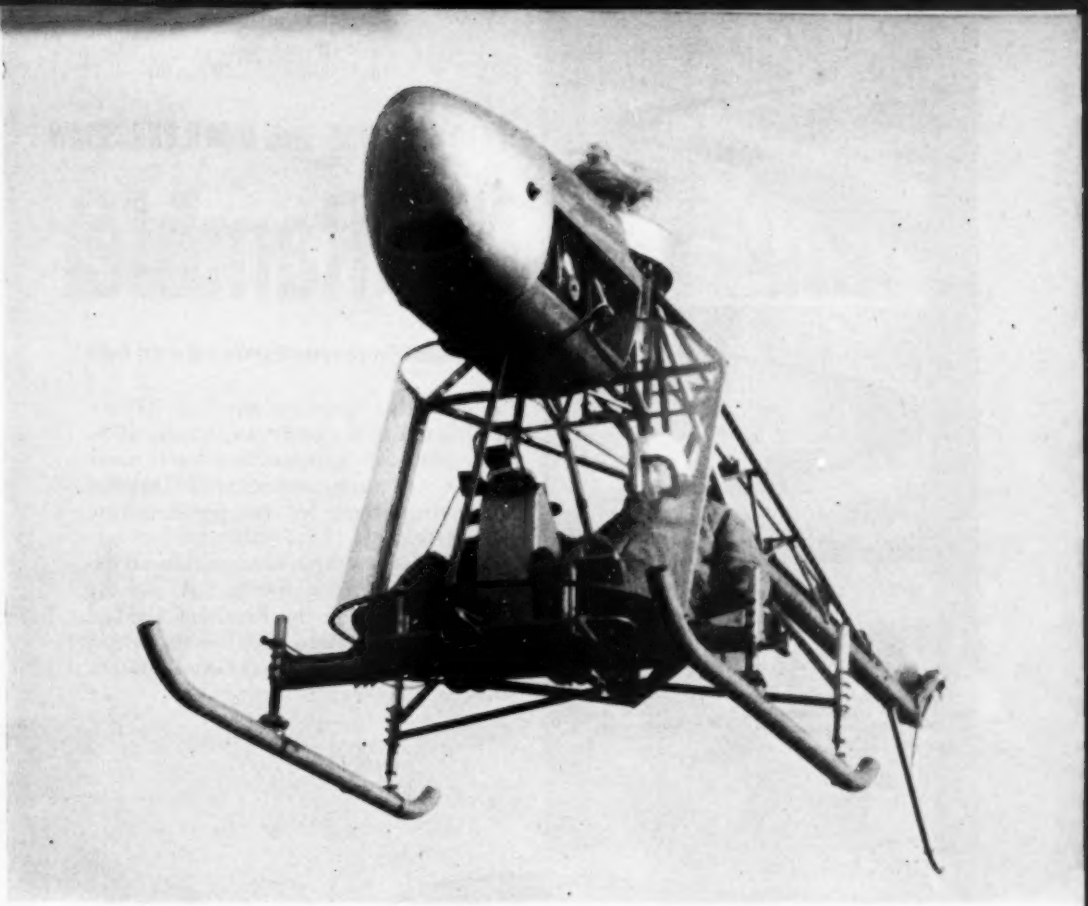
NBC's telescoping boom can shoot straight up to a height of 40 feet, extend horizontally, bend at the center joint to form any angle or revolve in a full circle. Attached to the cab of a truck, it can handle a load weighing 500 pounds.

Light Bulbs Honor New Queen

LAMP bulbs with the filament shaped to form a crown and the royal monogram ER (for Elizabeth Regina) will light up British homes to celebrate the forthcoming coronation of the Queen. The design was awarded a citation by a souvenirs committee.

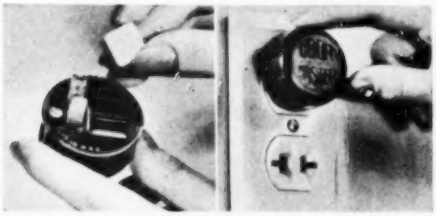
Crew of 18 Mans Baby Destroyer

THIS is Britain's new pocket destroyer—the *Bold Pioneer*. The first British vessel to combine gas-turbine and Diesel engines, she is operated by two officers, 16 men.



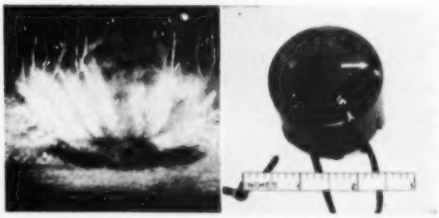
New Helicopter's Engine Rides Overhead, Close to Propeller

A NEW idea in helicopters—putting the engine overhead—is being tried in France. It eliminates some of the complicated drive shafts and gearing necessary when the engine is below or behind the pilot. The designer, Cantinieau, and manufacturer, MATRA, claim a complete absence of vibration, a reduction in weight and high performance on low horsepower. The machine weighs only 880 pounds empty.



Plug-in Wafer Freshens Air

A NEW room deodorizer that plugs into an electric outlet has two slots in its Bakelite body for chlorophyll tablets. Electric Deodorizer Corp., Detroit, makes it.



Death—in the Small, Handy Size

THIS Army anti-personnel mine weighs only 4½ ounces, fits the palm of your hand. But it does as vicious a job as the old nine-pounder and is a lot harder to detect.

WILBUR SHAW

'53 Rambler

Nash's lowest priced car has

THE Nash Rambler has had its face lifted and its power boosted for 1953. However, much more has been done for the car's appearance, which needed improving, than for its power plant, which did not.

Pinin Farina, the renowned Italian designer of expensive sports cars, did the face-lifting job on the Rambler. He had already handsomely restyled its bigger brothers, the Statesman and Ambassador.

I COULD SEE MORE OF THE ROAD over the '53 Rambler's lowered hood and through its bigger windshield. The glass area of the windshield is 165 sq. in. larger than last year's.

REPORTS FROM THE DRIVER'S SEAT:

Shows Italian Touch

been strikingly restyled and given an extra pinch of power.

When Farina, a short, chubby man with curly gray hair, visited the Nash factories in Wisconsin, his hosts were delighted with his great friendliness, rather surprised by the huge appetite he suddenly developed for hot dogs.

He has caviar taste when it comes to car design, however. He has got rid of the Rambler's former stubby look and given it stylish, continental lines.

The wheelbase—100 inches—is the same as ever, but the car looks considerably longer than it used to. Actually the over-all length has been increased only seven inches, mostly to provide a platform for the spare tire, which rides on the outside, center rear, and does much to give the Rambler that made-in-Europe look.

The biggest improvement in appearance is up front. The hood has been lowered 3½ to four inches and the glass

THE CONTINENTAL TOUCH is especially evident in the back of the car. I've got the spare in its rear position, where you have to put it to get at the catch on the lid of the rear deck.

Safer than most convertibles, the '53 Rambler retains its protective rigid window frames.

area of the windshield increased in proportion.

The fenders have been redesigned, and the front and back lights with them. The grille and the door handles are new. The bumpers are both of the wrap-around variety.

Stretching the air intake for the heater and interior-ventilation ducts all the way across the hood at the base of the windshield is an effective bit of styling that Farina copied from his designs for the bigger Nashes.

A boost to 85 horsepower—three above last year's figure—has been given the Rambler's six-cylinder, L-head engine for standard transmission and overdrive. However, this year, for the first time, an automatic transmission—a Hydra-Matic specially adapted to the size of the car—has been made available. For those willing to pay extra for this feature, a 90-horsepower engine is provided.

The power step-ups, bringing with them a maximum rise of 12 pound-feet in torque, were brought about in subtle

FACTS ON THE '53 NASH RAMBLER

Model: Custom convertible with Hydra-Matic.

Engine: 6-cyl. L-head; 90 hp. at 3,800 r.p.m.; compression ratio, 7.3:1; piston displacement, 195.6 cu. in.; bore and stroke, 3⅛" by 4¼"; piston travel (in feet per car mile at 20 m.p.h.), 1,792.35; torque, 150 lb.-ft. at 1,600 r.p.m.

Weight: 2,698 lb.; per hp. 29.98 lb.

Transmission: Hydra-Matic (optional); rear-axle ratio, 3.3:1.

Steering ratio: 19.5:1; radius of turning circle, 21'2".

Effective brake-lining area: 103.6 sq. in.

Springs: front, direct-acting coil; rear, insulated leaf.

Outside dimensions: height, 59"; over-all length with bumpers and guards, 185⅜"; width, 73½"; wheelbase, 100"; overhang, front 31 13/32", rear 54"; tread, front 53⅜", rear 53".

Inside dimensions: seat-cushion width, front 58", rear 45¼"; leg room, front 44", rear 37½"; headroom, front 36½", rear 35½"; seat height, front 12", rear 14"; vertical distance, steering wheel to seat cushion, with seat in rear position, 6¼"; front-seat adjustment, horizontal 5½", vertical ⅜".

Tire size: 6.40 by 15.

The dash was neatly restyled to conform with the lower hood and increased windshield area.

ways. The piston stroke was slightly lengthened, the intake and exhaust valves enlarged a bit, the design of the camshaft and manifold somewhat modified and minor changes were made in the carburetion.

I took a 1953 Rambler convertible for a brief whirl around Nash's Wisconsin proving grounds, which were coated with a thin, late-winter snowfall. The car was too new to put through grueling acceleration tests, but it was obviously peppier than before.

One feature that Farina has given the 1953 Rambler, and no other Nash, is its snorkel—the air scoop at the nose of the hood. The air that passes through the scoop cools the battery and, more important, lowers the temperature of the air at the carburetor intake a full 15°. This in turn creates a cooler, more efficient explosive mixture.

The chain reaction thus set off by the snorkel's breathing winds up where it will do the most good, in the rear axle. END

It still takes off like a scalded cat, only more so, because of the slight power step-up.

HERE'S YOUR Check List OF LITTLE CARS

MAKE AND MODEL	PRICE (in New York, does not include state or local taxes)	*MILES PER GALLON	NUMBER OF PASSENGERS	DIAMETER OF TURNING CIRCLE (ft)	CURB WEIGHT (pounds)	WHEELBASE (inches)	LENGTH (inches)	WIDTH (inches)	HEIGHT (inches)	SEAT WIDTHS FRONT AND REAR (inches)	HORSEPOWER	WEIGHT PER HORSEPOWER	NUMBER OF CYLINDERS	VALVE ARRANGEMENT	BORE AND STROKE (inches)	PISTON DISPLACEMENT (cubic inches)	COMPRESSION RATIO (:1)
AUSTIN A-40	$1,795	32	4	37	2,142	92.5	159	63	64	†22 39	42	51	4	OHV	2.5 x 3.5	73.17	7.2
CONSUL	1,738	30	5	41	2,435	100	169	64	60	54 53	47	52	4	OHV	3.1 x 3	92	6.8
HENRY J (4)	1,633	30	6	35	2,430	100	182	69	61	57 56	68	35.7	4	L-head	3.1 x 4.3	134.2	7
HILLMAN Minx	1,645	35	4	33	2,072	93	160	62	60	45 48	42	49	4	L-head	2.5 x 3.7	77.2	6.6
HUDSON Jet	1,918	20	6	36	2,700	104.3	180.6	67	60	58 58	104	26	6	L-head	3 x 4.75	202	7.5
HUMBER Hawk	2,395	27	5	37	2,856	105.5	174	70	64	49 61	58	49	4	L-head	3.2 x 4.3	138.2	6.3
MORRIS Minor	1,430	40	4	33	1,591	86	148	61	60	48 41	27.5	50	4	L-head	2.2 x 3.5	56.04	6.6
NASH Rambler	2,164	25	5	42	2,603	100	178	73	59	58 45	85	30.6	6	L-head	3.1 x 4	184	7.2
PORSCHE	3,395	21	4	34	1,715	82.6	151	65	51	†22 29	55	30	4‡	OHV	2.9 x 2.5	59	8.2
RENAULT	2,595	30	6	33	2,788	110.2	185	68	60	54 53	63	44.2	4	OHV	3.3 x 3.4	122	6.6
RENAULT rear engine	1,495	46	4	27	1,245	83	142	56	57	†19 41	23	54	4	OHV	2.1 x 3.1	45.6	7.5
ROVER	2,897	24	5	37	2,895	111	178	65	63	55 53	75	38.6	6	F-head	2.5 x 4.1	128.4	7.25
SINGER	2,595	30	5	33	2,325	107.5	176	63	64	50 53	48	48.4	4	Ovhd cam	2.8 x 3.5	91.3	7
STANDARD Vanguard	2,350	25	5	35	2,700	93	162	63	64	57 56	68	40	4	OHV	3.3 x 3.6	82	6.7
SUNBEAM-TALBOT	2,685	25	4	36	2,954	97.5	167	62	60	†20 51	70	42.2	4	OHV	3.2 x 4.3	138.2	6.45
TRIUMPH Mayflower	1,850	35	4	34	1,960	84	154	62	62	†23 39	38	52	4	L-head	2.5 x 3.9	76	6.8
VOLKSWAGEN	1,455	34	4	36	1,609	94.5	150	60	61	†19 53	24	67	4‡	OHV	2.9 x 2.5	69	5.8
WILLYS (75 hp.)	1,699	30	6	38	2,562	108	180	72	60	61 61	75	34	6	L-head	3.1 x 3.5	161	6.9
ZEPHYR	1,938	25	5	43	2,542	104	171	64	60	54 53	68	37.3	6	OHV	3.1 x 3	138	6.8

* Dealers' estimate. † Split seat in front. ‡ flat, air-cooled.

Triumph Mayflower is unique in styling among foreign sedans and convertibles sold in U. S.

This Year 25,000 Americans Will Buy

Little Foreign Cars

Versatile, economical and smart-looking, the perky midgets from abroad are making their mark on U. S. highways.

By Devon Francis

THE instruction manual reads: "The bonnet lock is controlled from the facia panel for added security against pilferage."

Reduced to Americanese, that means, "The hood can be unlatched only from the driver's seat, so nobody can swipe your plugs or distributor head."

A good many Americans will be reading such items from European automobile manuals this year for the first time. The invasion of the U. S. by Europe's small cars is on. Upward of 25,000 of these bantams will be sold here this year.

Most Americans, shopping for less-than-average-size automobiles, confine their thinking to the Nash Rambler, the Henry J, the Willys and the new Hudson Jet. The fact is that at least 18 small cars can be bought in hundreds of Main Street showrooms today.

All it takes for possession is the price,

BRITISH-MADE FORD ZEPHYR, together with sister car, the Consul (right) and Renault Fregate (below), have lines like those of current U.S. cars. Foot controls are pendant type.

LOWER-POWERED CONSUL, shown here with U. S. Ford in background, won first place in European elegance-in-design contest. It has a four-cylinder overhead-valve engine.

and prices range from slightly more than $1,400 to more than $3,000. These cars are *not* sports jobs, low, open and hard-sprung. They are genuine sedans and convertibles in the American sense of the words. And they have things to offer that can't be found in U. S. cars. They also have their shortcomings.

Let's run through the list.

The quotation about the bonnet lock comes from the brochure distributed to U. S. dealers in Singer cars, made in England. The Singer is one of the better of the foreign cars, selling here for just under $2,600 shipside. Its finely tuned four-cylinder engine, producing 48 horsepower, has something not to be found in any mass-production automobile on this side of the Atlantic—an overhead camshaft.

There's less machinery in an overhead cam and less chance of lash developing with wear.

Renault Turns Anywhere

Want a car that will turn around on a dime? Buy a little French Renault. Its turning circle is only 27 feet in diameter.

Compare that with 40 feet for the Ford, 37½ for the Chevrolet, 39½ for the Plymouth, 42 for the Rambler, 35 for the Henry J and 38 for the Willys.

Or you can buy a Hillman Minx, a Singer or a Morris Minor, all with a 33-foot turning circle. Or get real fancy and buy a German Porsche—it will draw crowds wherever you park it—that turns in 34 feet.

Want a car for less than $2,000 that looks as classy as a Rolls-Royce? Your vehicle is the Triumph Mayflower, sold in New York by Fergus Motors. True, it looks like a Rolls that has been left out in the rain and shrunk, but it's a midget queen guaranteed to stop traffic from Broadway to San Francisco's Market Street.

Independent Springing All Around

Want a car with independently sprung rear wheels? You won't get one from an American factory. Buy either of the Renaults, the little one or the big Fregate, to name two of the foreign cars that feature this. The principle involved is simple—two universal joints on each of the axle shafts leading from the differential to the wheels.

Want a car with a 12-volt ignition sys-

RENAULT FREGATE design was tested in airplane wind tunnel for sleekness of line before production was started. Car comes with both low- and high-voiced horns.

Rear-engine Renault, most economical of imports, is largely a woman's shopping car in U. S.

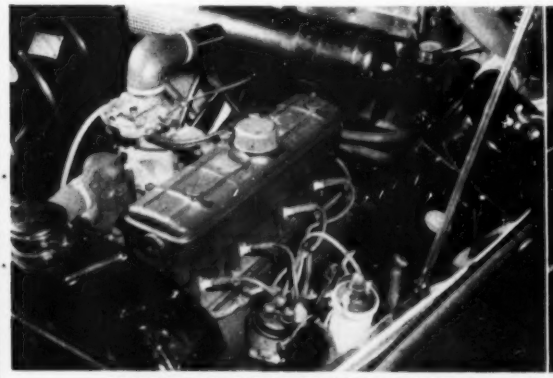
tem that takes the stubbornness out of an engine on cold mornings? Well, a few U. S. cars have it this year for the first time, but try to buy six volts—standard over here—in a European car!

As for prices, of the 15 foreign-made cars investigated by POPULAR SCIENCE MONTHLY, a half-dozen sell for less than $1,800, eight for less than $2,000 and the remainder, with one exception, for less than $3,000. Their average price is a shade over $2,150. In most cases a heater, and in some cases a radio, are thrown in.

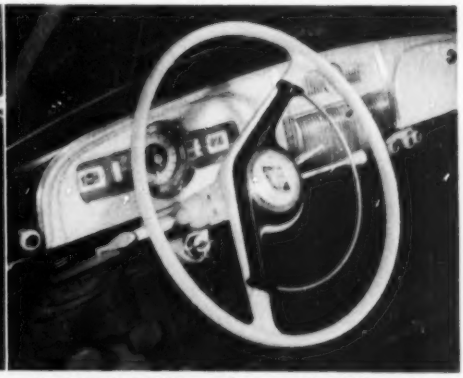
If you want all these virtues in a motor car, you have to accept some penalties.

By U. S. standards, these foreign cars are small. Most of them will tote only four persons in fair comfort. The seats are as much as a foot narrower than those in our small cars. Exceptions are the fair-size "big" Renault, Rover, Standard Vanguard and the British-made Fords.

The wheelbases of most of the imports are short. So they pitch more on rough



DESPITE LOW-COMPRESSION ENGINE, Fregate's high horsepower-to-weight ratio—for imported automobiles—gives exceptional top speed of 80 miles an hour.



FREGATE'S PANEL and controls follow U. S. styling. At left of steering column is combination low-horn and light control. At right of it are shift lever, turn indicator.

TINY VOLKSWAGEN, like small Renault, has engine in rear. It is same type used in sleek, peppy Porsche—a pancake, air-cooled four. Car also has independent rear suspension.

ROVER is one of "class" British cars, costing equivalent of more than $4,000 there with purchase tax. F-head engine has overhead intake valves and exhaust valves like an L-head.

roads. And their take-off when the light turns green leaves something to be desired. That's due to low horsepower and high transmission ratios.

The 58-horsepower British Humber Hawk, for example, has an over-all first-gear reduction of better than 16 to 1—the engine revolves 16 times for every revolution of the rear wheels. The 70-horsepower Sunbeam-Talbot's is 12.43 to 1.

That compares with 11 to 1 in first gear for the 68-horsepower Henry J, 9.47 to 1 for the 85-horsepower Rambler and 10.7 to 1 for the 75-horsepower Willys.

There is no such thing, of course, as an automatic transmission in a foreign car at the prices quoted (and only the Rambler, among the U. S. small cars, offers one). Nor is overdrive available. One European manufacturer erroneously refers to his fourth gear as "overdrive."

The modest horsepower in the imported cars makes high rear-axle ratios inevitable. That, in turn, limits cruising speeds.

The Hawk has a 4.55-to-1 axle, the big Renault a 6.8, the Austin a 5.28, the Minx a 5.22 and the Ford-made British Zephyr a 4.3. Those compare with these U. S. axles: Rambler 3.77, the four-cylinder Henry J 4.27 and the 75-horsepower Willys 4.1.

Cruising Speeds Limited

The comfortable cruising speeds of the foreign cars seldom go beyond 60 miles an hour and drop as low as 45 or 50. The exceptions only prove the rule—the brilliantly engineered little Porsche, for example, has averaged more than 95 m.p.h. for 72 hours straight.

Two-thirds of the foreign engines have long strokes. In this country we are tending more toward "square" engines, with length of stroke approximating the size of the bore. Long-stroke engines have a high thermal efficiency (they get more

POPULAR HILLMAN MINX, like some U. S. cars, has integral body and chassis for rigidity. Oil-bath air cleaner in export models and one-piece curved windshield are features.

ONE OF FEW imports with ample room for five passengers, Humber Hawk also has exceptional luggage space. Leather upholstery is standard. It comes in a half-dozen colors.

STANDARD VANGUARD station wagon is almost as big as a U. S. counterpart. It is produced by one of 37 British car makers—twice as many automobile manufacturers as U. S. has.

AUSTIN, biggest seller here among foreign cars, has fine leather upholstery, foam rubber cushions and heater at no extra cost. Like U. S. cars, doors lock with push buttons.

out of their fuel) but a lower mechanical efficiency (their friction losses are greater). A sprinkling of the imports have "over-square" engines, however—their bores exceed their strokes.

Steering Ratios Are Low

Foreign steering ratios are fast. Haul away on the wheel of a Zephyr as you would in most U. S. cars, and you'll be calling the crane wagon to pick you out of the ditch. Its ratio is 13.6 to 1—to get a given amount of front-wheel movement, you have to put more than 13 times as much movement in the steering wheel.

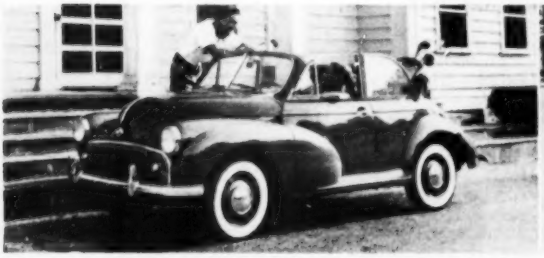
That's low. So is the Austin's at 14 to 1 and the Consul's at 14.1 to 1. Our little cars steer slower. The Henry J's ratio is 18.2, the Rambler's 19.5 and the Willys' 19.7.

Foreign styling is how you find it. Compared with the current slab-sided trend in the U. S., the imports look about as sharp as a celluloid collar. Fenders stick out. Windshields are flat. Some of the rear windows are peepholes. The exceptions are the exquisitely styled Porsche and those cars designed with the American market in mind.

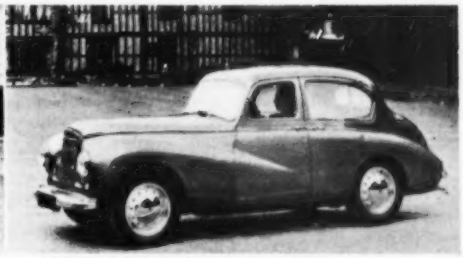
The foreign manufacturers have news for U. S. buyers this year. The big Renault, with its engine in front instead of behind, is fresh on the American market. Austin has spruced up its little sedan and added a neat convertible for less than $2,000. The Sunbeam-Talbot has a lot more braking surface and more headroom. Other exporters to the U. S. have followed suit.

A word of caution: if you buy one of these foreign cars that don't *sprechen das Englisch* or *parlent l'anglais,* be sure your servicing and repair man can interpret admonitions reading:

"Reinigung und Olwechsel alle 2,500 km." or, *"Les véhicules réparés avec des pièces autres que Renault d'origine perdent tous droits à notre garantie."* END



TORSION BARS, unknown to mass-production U. S. cars, suspend front end of Morris Minor. Body and frame, like Minx, are welded together. All British cars have full tool kit.



WINNER of many international speed and endurance events, Sunbeam-Talbot is another of British "class" cars. Front seat adjusts not only for leg room and height but slant, too.

Hudson Brings Out Most Powerful Small Car

Weighing only 2,700 pounds, the thrifty 104-horsepower Jet wriggles in and out of traffic.

EVER since the dog days of last summer, certain people in Detroit have been hinting darkly out of the sides of their mouths about a new car that would beat anything else in its price class away from a traffic light.

Last month this automobile went on display in dealers' showrooms all over the U. S.

The Hudson Jet (PSM, Feb. '53, p. 97) —for that's what it proved to be—is the most powerful car, for its weight *and* price, made in this country. Each of its 104 horsepower totes only 26 pounds of car.

The weight-to-horsepower ratio is even more impressive in the 114-horsepower Super Jet—23.6 pounds. The Super Jet is the same Jet but it comes equipped with a different cylinder head, a higher compression ratio, twin carburetors and fancier trim.

Here, for purposes of comparison, are the weight-to-horsepower ratios of other

FACTS ON HUDSON JET

Model: 4-door sedan.

Engine: 6-cyl. L-head; 104 hp. at 4,000 r.p.m.; compression ratio, 7.5:1; piston displacement, 202 cu. in.; piston travel (in feet per car mile at 20 m.p.h.), 2,470; bore and stroke, 3" by 4¾"; crankshaft bearing surface, 42.77 sq. in.; torque, 158 lb.-ft. at 1,600 r.p.m.

Weight: 2,700 lb.; per hp., 26 lb.

Transmission: 3-speed synchromesh; rear-axle ratio, 4.1:1 (with Hydra-Matic, 3.54:1).

Steering ratio: 20.2:1; radius of turning circle, 18'.

Effective brake-lining area: 132.14 sq. in.

Springs: front, coil; rear, semi-elliptic.

Outside dimensions: height, 60"; over-all length with bumpers and guards, 180 11/16"; width, 67 1/16"; wheelbase, 104⅝"; overhang, front 32⅝", rear 44 3/16"; tread, front 54", rear 52".

Inside dimensions: seat-cushion width, front and rear 58"; leg room, front 41⅞", rear 38½"; headroom, front 36⅝", rear 35⅝"; seat height, front 13¾", rear 14⅝"; vertical distance, steering wheel to seat cushion with seat in mid-position, 5⅞"; front-seat adjustment, horizontal 4", vertical ½".

Tire size: 5.90 by 15.

HUDSON'S SUPER JET has "step-down" interior and integral body and frame like company's standard cars. Four-door sedan is only model.

American automobiles selling in the low-cost field.

Chevrolet–30 lb.	Nash Rambler–30.6
Chevrolet Powerglide–30.5	Plymouth–31.7
Ford V-8–29	Studebaker Champion–33.6
Ford Six–30.8	Willys (90 hp.)–28.4
Henry J Corsair–31.9	Willys (75 hp.)–34
Henry J Four–35.7	

For a pretty-good-size car, the Jet is light. It weighs 2,700 pounds. That's several hundred pounds less than the Chevrolet, Ford, Plymouth or Studebaker will scale. The Jet does outweigh, however, the Henry J, Rambler and Willys. It's economical—it will get at least 20 miles to the gallon. And it will accelerate from zero to 60 m.p.h. in 14 seconds.

Paring Off the Pounds

The curious in-between weight of the Jet is the result of the target that the engineers of the Hudson Motor Car Co. set for themselves. In these days of rapidly mounting automobile horsepower, Hudson wanted a car of only modest horsepower (for economy) that would sizzle on street and highway. A high horsepower-to-weight ratio was the only answer.

Other qualities were a natural or necessary result. To keep the weight down,

L-HEAD ENGINE has as high a compression ratio for its type as any in the industry. Battery discharge and low oil pressure are shown on driver's instrument panel by red lights.

GAS FILLER TUBE is in rear. Usable space in trunk is 44 inches deep by 40 wide and 22 high. Wrap-around rear window, measuring 63½ by 15½ inches, gives excellent visibility.

they had to lop off pounds by shortening the wheelbase, length, width and overhang. That gave them a car that wriggles through traffic like a scrollsaw blade through soft pine. To keep the speed and acceleration from being a hazard, they had to have a low center of gravity.

To have low weight and yet not jar a man's upper plate from its moorings on a washboard road, they had to have extra-soft suspension and lightning-fast snubbing when the springs rebounded.

To pare down the width of the car, they had to trim the seat cushions. That brings down the hip room to a little less than what the average car buyer, spoiled by wide seats, is accustomed to. To put the back-seat passengers between the axles for an easy ride, they had to cut down the leg room in the rear.

But whatever shortcomings the Jet may have are more than offset by its basic design, good engineering, styling and performance. The steering is light. Gear shifting is exceptionally easy. The car is like a cat on its feet. The fast snubbing cancels out any tendency to pitch on the short wheelbase.

The Jet is one of the few cars with an advanced-compression engine that won't get indigestion on non-premium gasoline. At 8 to 1, the Super Jet's side-valve engine, as the British more descriptively call the L-head, can be accelerated from a walk in high gear without pinging.

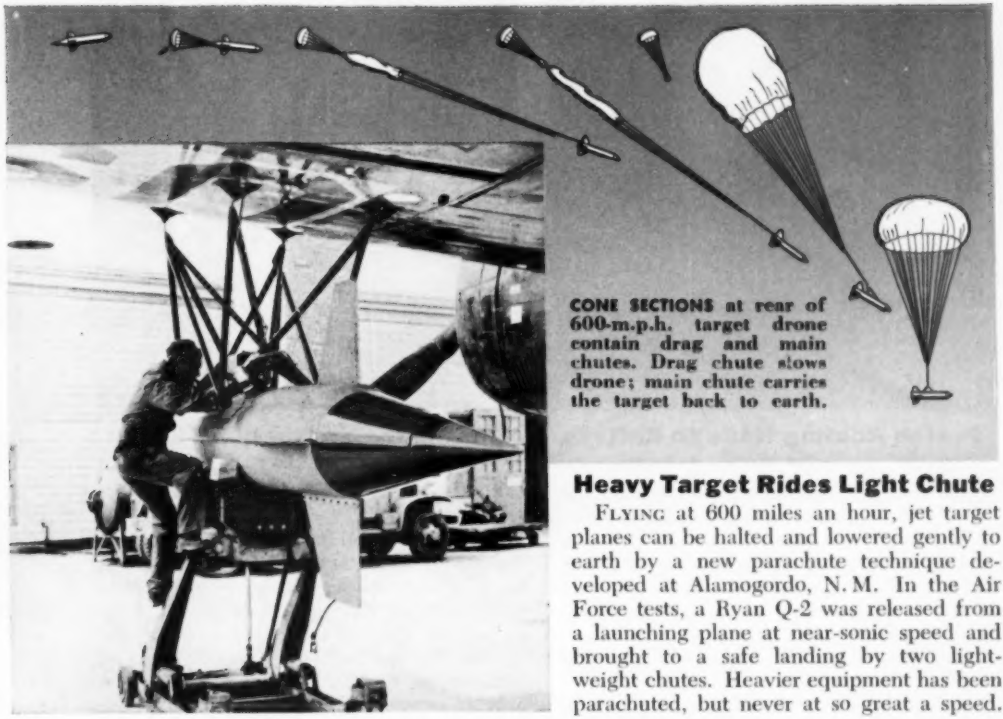
Part of the secret of that is a high-turbulence combustion chamber. The rest is twin carburetors, introduced in Hudson Hornets on the stock-car race tracks, for easier breathing.

Car's Interior Is Eye-Catching

The Jet's interior trim, particularly that of the Super, is luxurious. Fabrics are rich. The area of the rear window is nothing short of magnificent. The instruments are shrouded against windshield reflection at night. And the heater-ventilation controls, reading like a child's primer—"Winter" for cold weather and "Summer" for hot weather—don't require an hour's cockpit check-out to understand them.

The retail cost of the "stripped" Jet is right at the level of the Big Three—Ford, Chevvy and Plymouth. A "stripped" car isn't as bad as it sounds. It only means a car minus heater, radio and turn signals, and less shiny metal trim.

But if you're going to want a Hydra-Matic transmission (which is available), 10 more horsepower and chrome enough to draw sour-grape comments from your neighbors, the price—as in all cars—begins skyrocketing. Prepare to shell out several hundred dollars more. As a matter of interest, the costliest Jet still won't be as costly as the flossiest of the Big Three.—*Devon Francis.*



CONE SECTIONS at rear of 600-m.p.h. target drone contain drag and main chutes. Drag chute slows drone; main chute carries the target back to earth.

Heavy Target Rides Light Chute

FLYING at 600 miles an hour, jet target planes can be halted and lowered gently to earth by a new parachute technique developed at Alamogordo, N.M. In the Air Force tests, a Ryan Q-2 was released from a launching plane at near-sonic speed and brought to a safe landing by two lightweight chutes. Heavier equipment has been parachuted, but never at so great a speed.

They Cut Holes in This Brand-New Cadillac—for TV Cameramen

YOU don't usually cut two holes in the roof of a new Cadillac and load the big boat down with a ton of luggage before starting a short trip. But that's what the National Broadcasting Co. does to provide TV coverage of news events such as the recent inaugural parade. The mobile unit is equipped with two turrets, one mounting a studio-type camera, the other a rotating antenna to beam the television signal to a relaying station in a building nearby while the car is moving.

Prefab Roofing Nails to Rafters

SHEATHING, insulation and roofing material put together like a triple-decker sandwich form a prefab roofing unit that's nailed right down over bare rafters. It comes as panels made up of two boards separated by wood strips to provide air space for additional insulation and more strength. Each unit interlocks with the next one, eliminating nailing on the exposed edge and holding it down against wind and rain.

Single panels with only one wood strip can be laid over old roofs. The Armor-Cel Corp., Knoxville, Tenn., makes units with surfaces of copper, aluminum, mineral granules or marble chips.

X Marks the Spot—of a Tumor

THE girl above is having her brain mapped to find a tumor. She has been given a shot of radioactive boron, which travels to the brain in the blood stream, concentrates in the tumor and sends out rays in straight lines. The twin scintillation detectors on either side of the girl's head pick up the beams. By varying the position of the detectors, the researchers can map a series of crisscrossing straight lines—and where these lines all cross is the spot in the brain where the tumor is located.

The picture, which was made at Massachusetts General Hospital, is from the American Cancer Society.

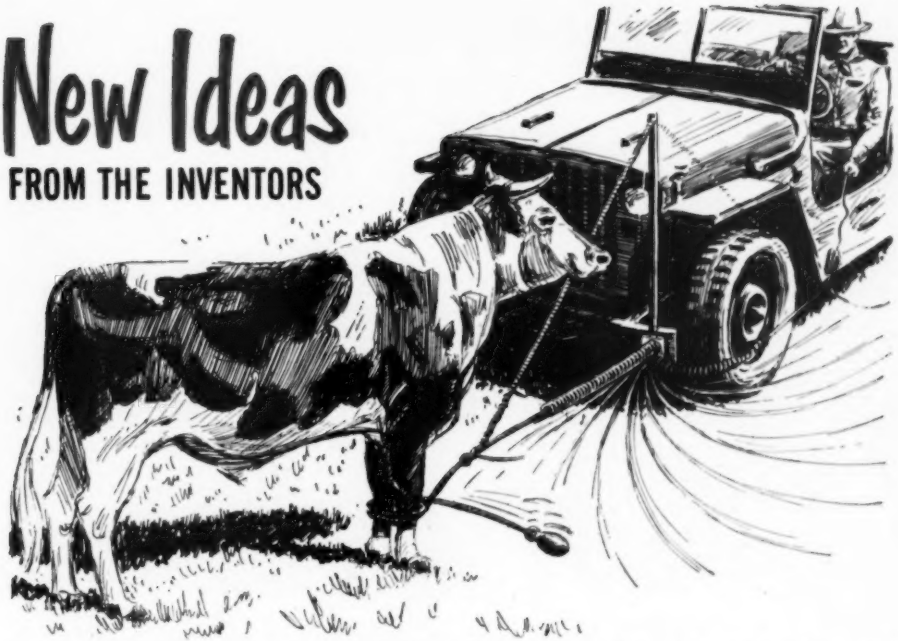
Helicopter Runs on Air

JETS of air power this new French helicopter, called the Djinn. The air, compressed by a pump, is routed up through the rotor and spewed out the tips to turn the blades. The one-man 'copter weighs only about 500 pounds.

Giant Jet Will Exceed 500 M.P.H.

WHAT Britain's first military jet transport will look like is shown by the sleek model above. Powered by four Rolls-Royce bypass jet engines, the giant 146-foot, swept-wing Vickers 1000 will carry 150 passengers at speeds greater than 500 m.p.h.

New Ideas
FROM THE INVENTORS



1 "Bola" on Jeep to Rope Cattle. Reverting to wildness on southern grazing lands, cattle will run from a man afoot or on horseback—but are unconcerned if he drives right up to them in a jeep. So a motorized cowboy could catch them with this mechanized version of the South American "bola." Released as shown, a spring arm would whirl a weighted cord around a surprised animal's legs and hobble it.

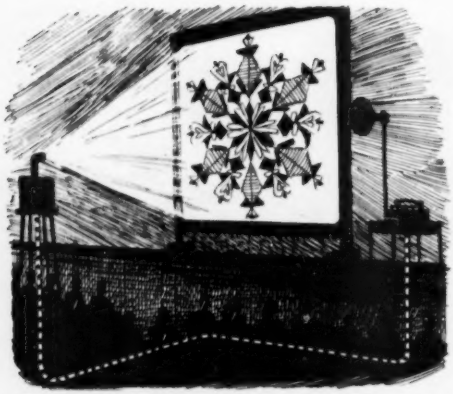
2 Gloves to Have Claws. To aid a housewife in gripping meat being prepared for the table, these kitchen gloves would provide claws of metal notched in saw-tooth fashion. The gloves are to be made of washable plastic. The inventor thinks they'd come in handy, too, for butchers and restaurant workers.

3 Knob Cover to "Lock" Door. Lest small children fall downstairs or wander where they shouldn't, this slotted plastic cover would slip over the knob of a forbidden door. In little hands, it would spin freely without turning the knob. An adult could grasp the knob by inserting fingers through the cover slots.

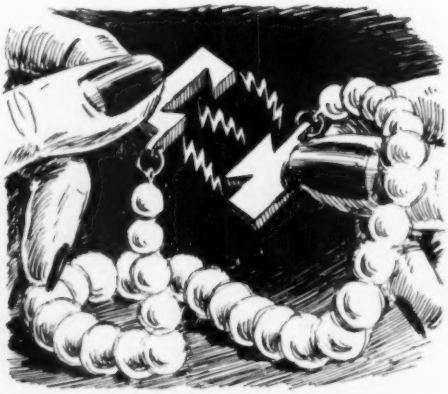
Please turn the page for more new ideas.

MORE New Ideas from the Inventors

4 Bullet to Aid Marksman. A new kind of tracer ammunition would apply the recent discovery that zirconium metal or alloy, crushed suddenly to powder, takes fire. At night, a bullet tipped with this alloy would tell where it struck by a flare of light—with no luminous streak in flight to betray to an enemy where it came from. In daylight, the alloy could ignite a black-powder charge to give a puff of smoke.



5 Music to Project Designs. The toy kaleidoscope, whose symmetrical patterns change when you jiggle it, would become a theatrical attraction in this version. Musical recordings, heard simultaneously, would vibrate it, and designs formed by the rhythms would be projected upon a theater screen.



6 Magnets to Lock Clasp. So that fingers needn't fumble with tiny catches, an inventor has designed magnetic jewelry clasps, shown above applied to a necklace. Permanent magnets within the easily joined halves would hold them firmly together until intentionally separated.

U. S. patents on these inventions have been granted to: 1. Burwell D. Manning, Columbia, S. C.; 2. Clark H. Weaver, Berkeley, Calif.; 3. Charles F. W. Liedtke, NYC; 4. Peter P. Alexander, Beverly, Mass.; 5. Johann Friedrich Elsaesser, Kirchberg, Switzerland; 6. Frederick Hornik, Brooklyn.

LOCAL TVI COMMITTEE of hams and hobbyists, sponsored by FCC, can help you locate sources of man-made static. Here, members of Bellerose, N. Y., committee check effect of a suspected oil burner.

U. S. Declares War on Static

The FCC is hot on the trail of man-made interference that scrambles TV screens.

By George H. Waltz Jr.

TELEVISION pictures soon will be getting better and better all over the country. For Uncle Sam is waging a quiet war to rid the air waves of radio interference—those wayward, accidental signals that send weird patterns zigzagging and herringboning across our TV screens. It's a war that all of us can help to win.

Interference has been with us since the days of the crystal set. Just about anything electrical can cause it. But lately our modern electronic way of living has made it worse.

And not only TV suffers. Interference can disrupt airline navigation aids, cripple military communications, even serve as a homing beam for enemy guided missiles.

So the armed services, radio hams, local civil-defense organizations, industry and the Federal Communications Commission are fighting man-made static. Using the Commission's vast network of direction finders,

BEFORE this electronic preheater for plastics was interference-proofed it set up a dark band of interference on nearby TV screens.

AFTER adjustments were made and earlike shields were added, interference was completely eliminated as shown by typical screen image at the left.

prowl cars and field stations, experts are seeking offenders and shutting down faulty equipment.

A radio channel used by the National Airport in Washington, D. C., was jammed by interference so badly not long ago that airline operations had to be suspended. The FCC's big direction finders located the source on the coast of Massachusetts. Crews in prowl cars fitted with short-range detectors converged on New Bedford. There, in a small plant, they found the culprit—a radio-frequency heater.

Such devices have disrupted vital communication systems thousands of miles away—one in a New York plastics plant recently jammed a Coast Guard radio station on the West Coast. They can also ruin TV reception along the way.

Hospital Machine Jams Cops' Radio

So can diathermy machines. When the radio of the Illinois State Police was jammed off the air not long ago, FCC investigators traced the trouble to a diathermy machine in a St. Louis hospital.

This doesn't mean that every time your TV screen goes berserk you should blame your neighborhood doctors or nearby industrial plants. Some innocent-looking device in your own home or your neighbor's might be at fault.

A gray-haired grandmother, rocking contentedly in her chair, recently set up interference that affected an entire neighborhood. On chilly evenings she sat with a heating pad nestled against her back. Every time she rocked a circuit in the pad opened and closed, radiating interference for blocks around.

Screen Goes Wild Every Saturday Night

Then there was the case of the haunted program. One TV owner complained that his favorite Saturday-night program was completely blanked off his screen by violent interference. Since every other program during the week, even on the same channel, came in fine, the man was convinced that some prankster was deliberately trying to stop him from seeing that one show. He demanded that the FCC do something.

An investigator arrived the next Saturday. The set operated perfectly until the program in question was about to come on. Then the screen went wild.

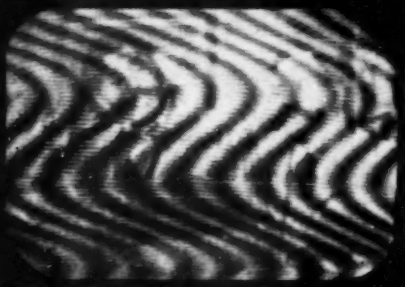
The investigator set up his "snifter," a

How Man-Made Interference May Look on Your TV Screen

Photos from Remington Rand, Inc.

FM BROADCASTS
Signals can cause this interference.

OLD-STYLE LAMP
Obsolete tungsten filament can do this.



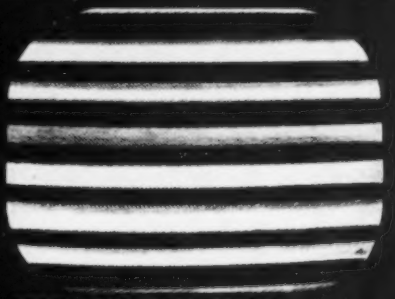
TV BOOSTER
Accessory nearby can ruin image.

HOUSEHOLD APPLIANCES
This is interference from heating pad.

DIATHERMY EQUIPMENT
Faults generally show up this way.

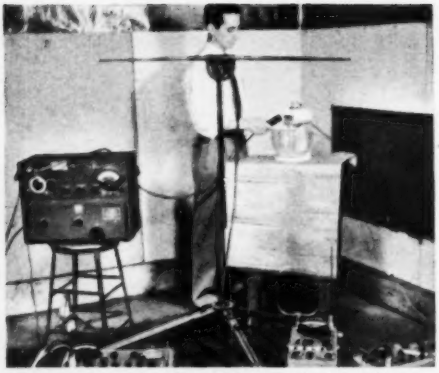
OTHER TV SET
HF oscillator can cause this pattern.

AMATEUR STATION
Harmonic interference from a ham set.



ANY AM STATION
TV set is overloaded. Needs filter.

FCC PROWL CARS search out causes of interference. Once general location is known, crews pinpoint it with hand-carried gear.



HOME-APPLIANCE DESIGNS are checked for interference by most manufacturers. Above, Westinghouse engineer tests food mixer.

portable interference detector, and went to work. In no time, he had located the source of the trouble—the set owner's father-in-law. He was sitting close by the screen—and wearing a hearing aid. This was the one program each week that he liked to watch, and his hearing aid was out of kilter. It sent out waves like a miniature transmitter.

If you are troubled with interference on your own set, first check the electrical appliances in your own home. Interference could be caused by anything from the exhaust fan in your attic to the oil burner in your cellar. Vacuum cleaners, automatic fish-tank heaters, bottle warmers, electric blankets, auto ignition systems and deodorizing lamps can raise havoc with TV reception.

Light Bulbs the Culprit

Even electric-light bulbs can be the source of trouble. Worcester, Mass., had an epidemic of TV interference until the power company offered to replace old-style tungsten-filament lamps with the modern variety free of charge. Some 150 of the old lamps were turned in and the complaints from TV viewers dropped to nil.

By making use of the typical patterns shown in the illustrations, it isn't hard to track down interference sources in your own home. Once you think you have the source located, turn it off and see if your TV screen clears up. Repeat the process with other likely appliances.

Do a Little Sleuthing on Your Own

If you feel sure something in the house next door is causing the trouble, ask your neighbor to pull his main switch while you watch your set. If the interference pattern persists, your neighbor is in the clear. If it disappears, get him to check his appliances.

If all your own efforts at amateur sleuthing fail, call the local office of the Federal Communications Commission and ask for the name and address of the chairman of the nearest TV Interference Committee. These groups, sponsored by the FCC and now being organized in most large communities, are made up of volunteer radio hams, power-company employees and interested technical people. Working in their spare time, they are glad to help the TV owner combat interference. END

Keep Your Distance

WHAT's a safe distance at which to follow the car ahead? It's easy to figure by simple arithmetic. Divide your speed in miles per hour by five. Multiply the answer by itself. Then add your speed in m.p.h.

Thus, at 50 m.p.h., you should get no closer than 150 feet to the car in front of you, suggests Harrison Hill of the Connecticut Highway Dept.

Dishwashing Can Be Easy

1. The pull-out dishwasher (at left) fits into the gas range. It needs no plumbing, wiring or cabinetwork. At dishwashing time you roll it to the kitchen sink, attach it to the hot-water faucet and plug it into an electric outlet.

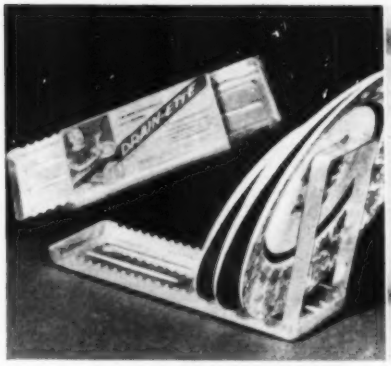
The washer creates its own correct water temperature and water pressure to scrub and sterilize dishes. It dries them with radiant heat in two minutes after the final rinsing.

The Universal stove has automatic ignition for oven and broiler and a four-hour electric-clock control. Burner wells are white porcelain.

2. Dish drainer of aluminum holds 24 dishes, folds flat for storage. It comes in handy as an extra drainer for the clean-up after big parties or for daily use in tiny kitchenettes where space is at a premium.

3. Steel-wool holder keeps hands safe from slivers of metal. A snap-action spring grips the steel wool securely and a neoprene gasket backs up the pad and bends to conform to curved surfaces.

4. Rubber gloves have herringbone-patterned palms and fingers, and a fabric lining that stretches with the latex. Nonslipping, touch-sensitive, they let the wearer grip china or pick up a pin.

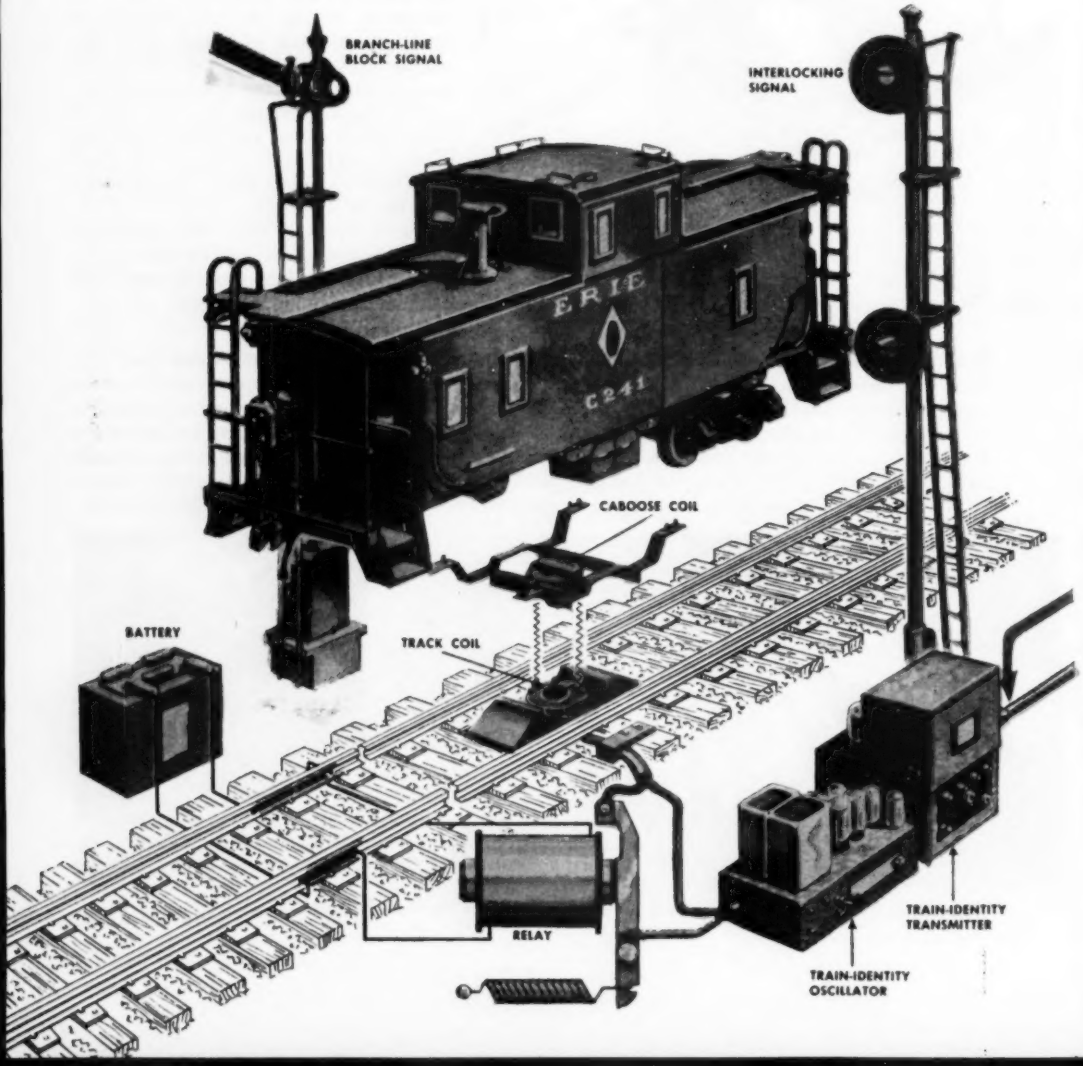


Further information on these products can be obtained from: 1. Cribben & Sexton Co., 700 N. Sacramento Blvd., Chicago; 2. American Transmarine Co., 95 Madison Ave., NYC; 3. Safeway Specialty Corp., 114 Spring St., NYC; 4. International Latex Corp., Playtex Park, Dover, Del.

Educated Caboose Checks In

A NEW train identity system brings railroad dispatching one step nearer the all-push-button stage. Already the dispatcher, sitting at his "ouija board," frequently throws switches more than 200 miles away. Lights on a track-layout diagram give him a clear picture of the location of every train on his division, and even the time the train passes each switch may be recorded on his chart. Just about the only information he hasn't had until now is an automatic way of telling what train was at which switch. Now he knows, thanks to an electronic gadget developed by the General Railway Signal Co. for the Erie Railroad.

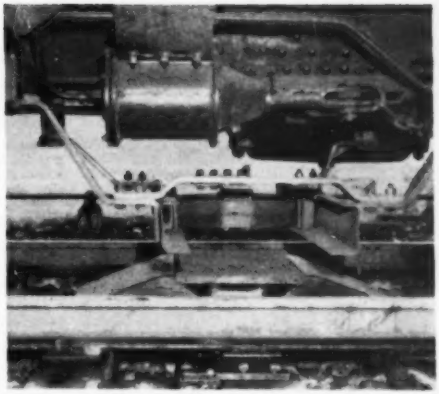
The system is in use on the Erie's main line 22 miles west of Salamanca, N. Y. When a branch-line freight rumbles onto the main tracks there, the caboose checks itself in, sending a coded message to Salamanca's big Centralized Traffic Control machine. There, the electric impulses close relays that flash a light on the dispatcher's panel, and lower a pen to a slowly moving train chart.



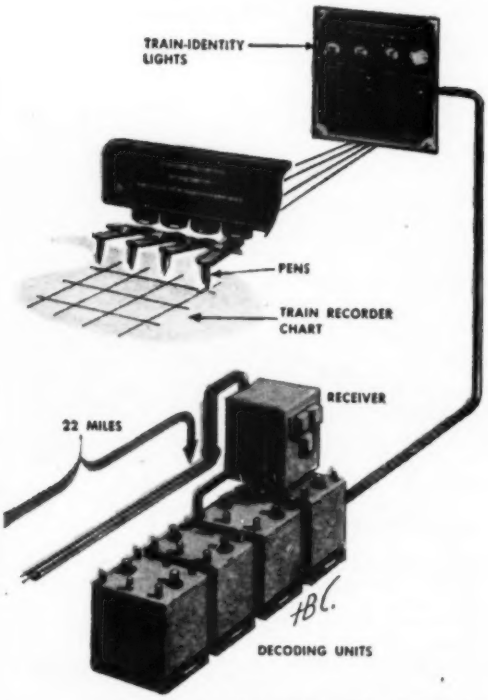
Cross lines on the chart indicate the exact time the signal was received.

There are four train-identity light-and-pen combinations on the panel—one for each of the four cabooses used on the branch. To operate the right combination, each caboose sends out its own code signal, which can be picked up by only one set of relays. Checking the light on the panel, a dispatcher knows which caboose has entered the main line, and his records already show to what train it has been assigned.

Because there is no need for the Salamanca dispatcher to identify trains traveling in the opposite direction, the train-identity circuit will not work when a car is coupled to the branch-line end of one of the four cabooses. In that case the car's axles draw current away from a relay, causing it to break the circuit.



METAL RAMPS and a wooden cover protect track coil. Caboose coil, which passes half a foot above it, has no electrical connections. A condenser tunes it to a fixed frequency.



ROADSIDE OSCILLATOR sends alternating current to track coil at rapidly changing frequencies. Coil under each caboose responds to only one frequency. Reaction of passing caboose coil makes oscillator set up special code in transmitter. Code is received in distant CTC machine and closes correct light-and-pen circuit.

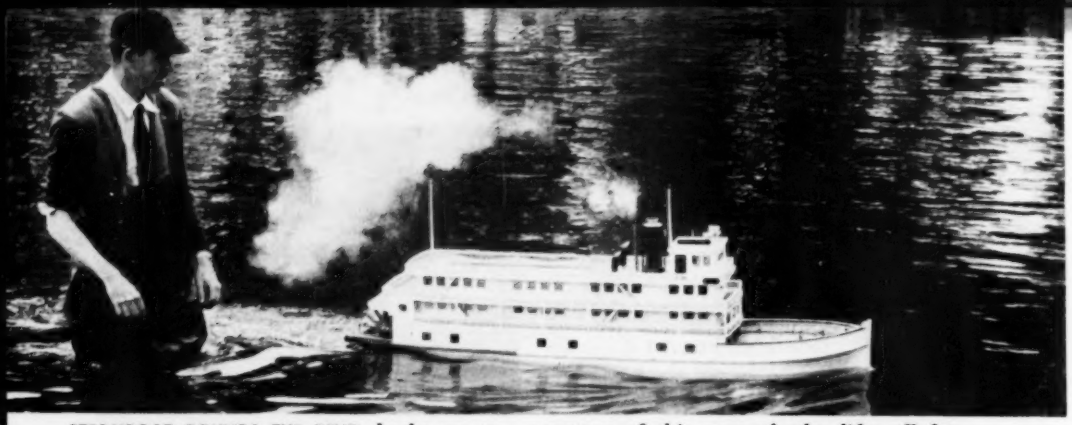
They Say Now.....

"Science, extended by curiosity, has no geographical boundaries—its boundaries are the boundaries of the mind."—Dr. A. M. Zarem, Stanford Research Institute.

"Parental care has reached its highest and most elaborate development in birds."—Prof. S. Charles Kendeigh, University of Illinois.

"Technology is everybody's rich uncle."—Henry B. du Pont, E.I. du Pont de Nemours and Co.

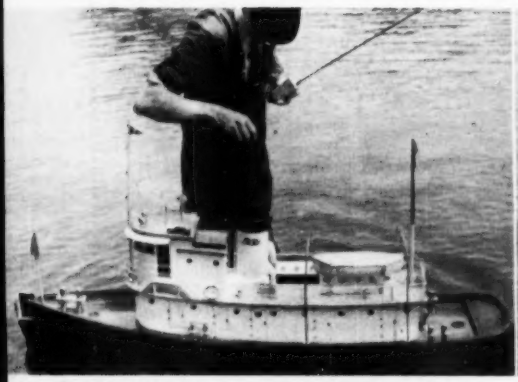
"Let us assume that an atomic-energy plant extending over an area of several square miles could make one H-bomb per day. . . . The energy of sunlight itself falling each day on such a plant would be roughly equivalent to the energy of the one H-bomb produced per day. This readily available energy of sunlight has scarcely been tapped."—Dr. S. Granick, Rockefeller Institute for Medical Research.



STEAMBOAT ROUNDS THE BEND, backs up or docks at the will of a human pilot. The superstructure of this stern-wheeler lifts off for access to boiler, engine and radio receiver.

Live Steam, Radio Run These Scale-Model Ships

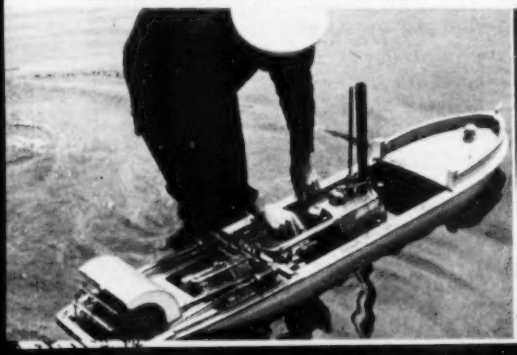
THESE ships go down to the sea without men, but to watch them you'd swear there were pilots aboard. The members of the San Francisco Model Yacht Club who built the steam-powered models use radio control. Five tone signals transmitted on one radio frequency work rudder and throttle. The receivers are housed forward, boilers amidships and engines aft.



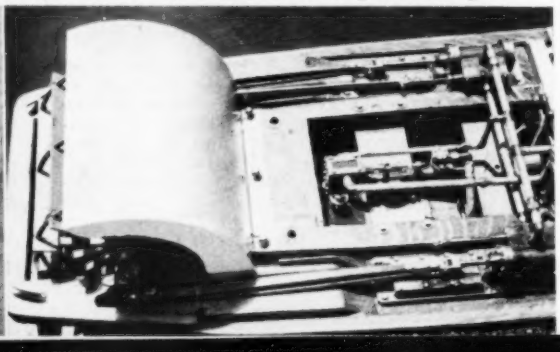
RADIO CONTROL works on a frequency that requires no amateur license. The transmitter is small enough to be held in the hand (above).

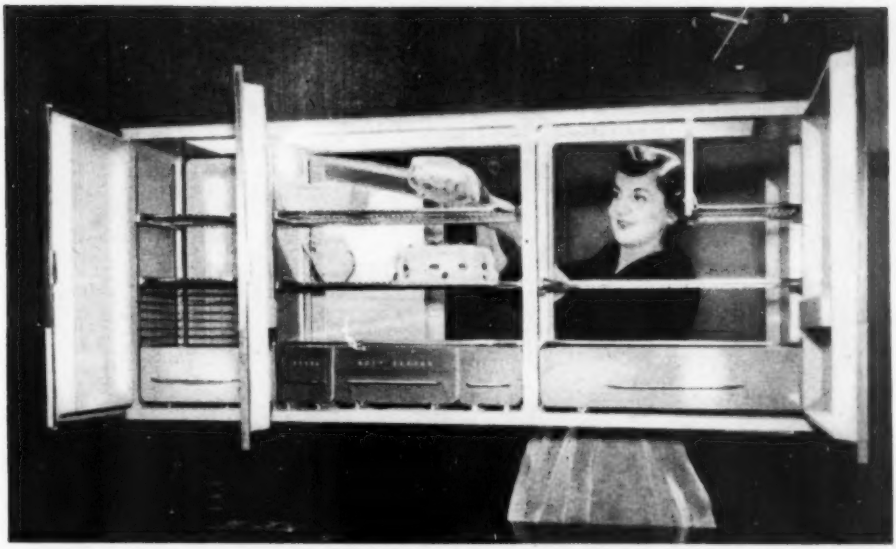
SEAGOING TUG weighs 125 lb., is 74″ long. Its ⅞″-bore, 1″-stroke engine develops ⅓ hp. Boiler pressure runs up to 110 lb.

STERN-WHEELER'S BOILER is a semi-pot type with central flue and water tubes. It is fired by a vaporizing gasoline torch. Most of hull is occupied by machinery. Radio receiver is housed under the closed deck forward.



TWIN-CYLINDER ENGINE of river boat has typical long stroke, working directly on paddle-wheel shaft. Bore is 1″, stroke 3″. Steam pipes are insulated. Boiler feed pump (amidships between cylinders) is steam-powered.



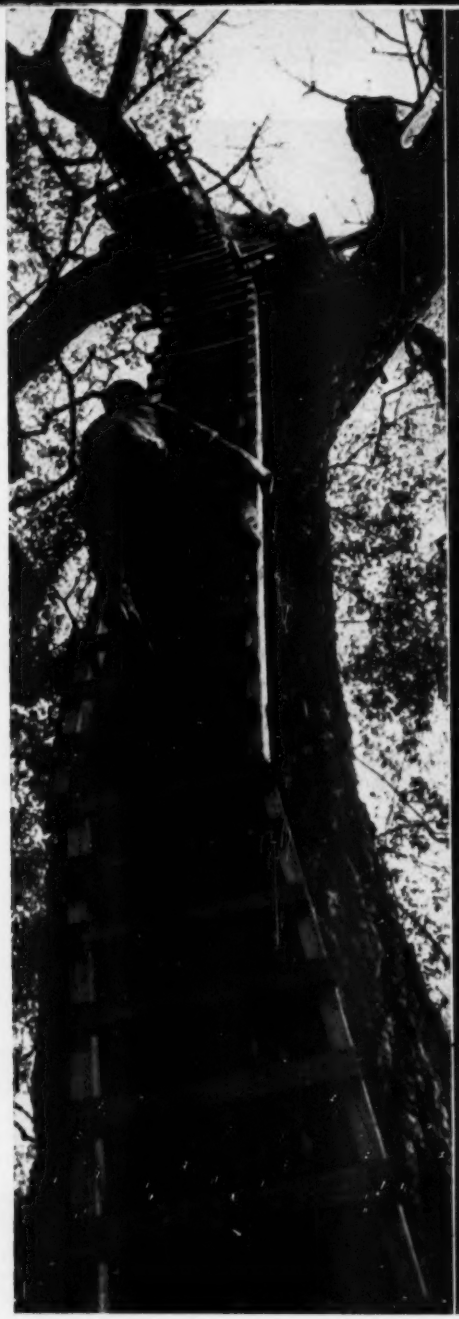


Half-Size "Dream" Refrigerator Holds Just as Much

Is THIS the refrigerator-freezer of the future? An experimental model, it takes up about half the space used by today's 10-cubic-foot refrigerator. A thin-wall insulation—½ inch thick instead of three—whittles down size. Magnetically sealed doors open from two sides. General Electric developed the insulation and built the XR-10.

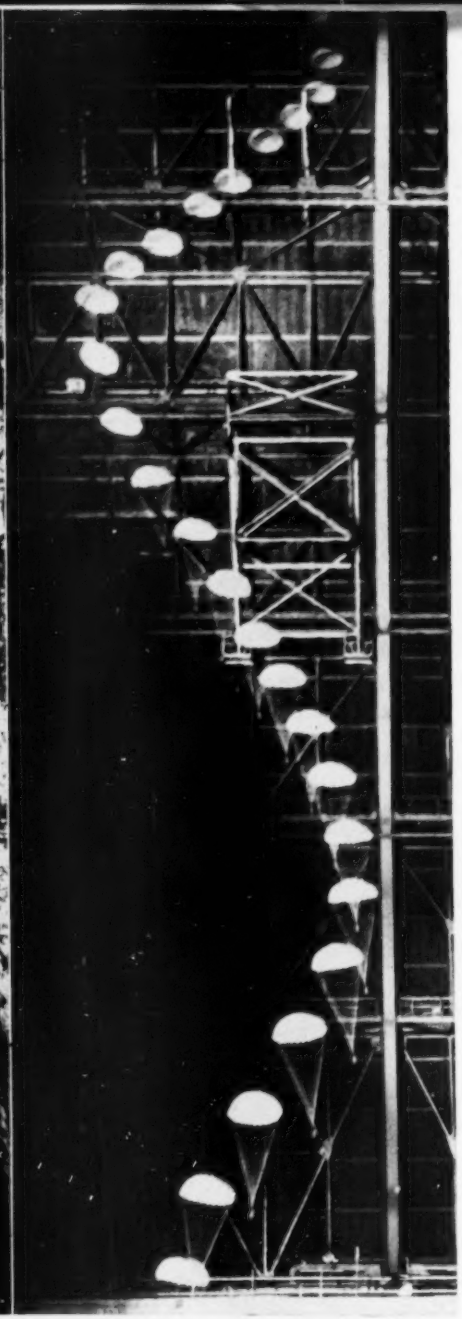
Portable Sales Sample Gives House Hunters a Break

"FLAT" hunting is less wearing in England this spring. A large housing firm has put a traveling salesman to work showing its wares. With sales case in hand, he goes to the prospective customer. When the case is opened, a scale model of a typical layout appears. The firm builds two-story garden apartments.



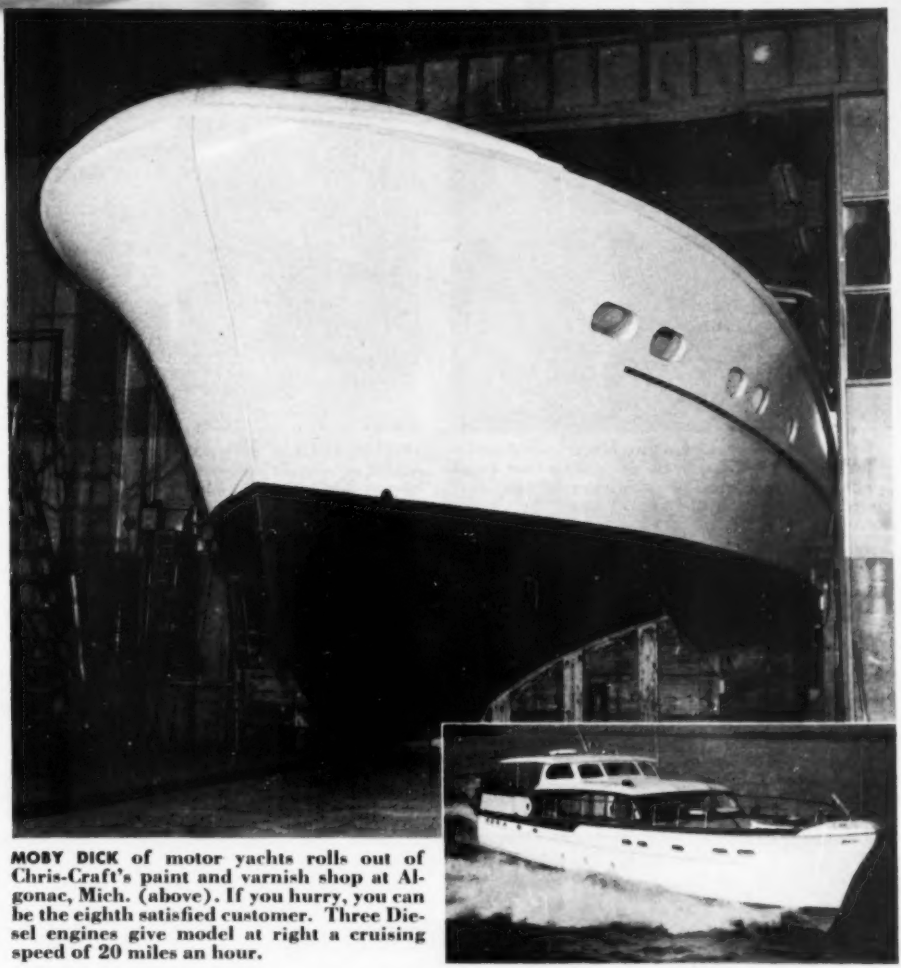
Army Hunts Mosquitoes Up Trees

WHAT looks like monkey business above is just a new approach to cut down jungle yellow fever. The soldier is climbing a gigantic hardwood in the rain forest of Panama to trap for research disease-bearing mosquitoes that feed on monkeys.



Airship Dock Tests Chutes

FLYING saucers in formation? Nope, one free-falling parachute photographed in a series of stroboscopic exposures. The chutes are dropped from ceiling to floor in an airship dock while Goodyear technicians photograph them for drag and stability studies.



MOBY DICK of motor yachts rolls out of Chris-Craft's paint and varnish shop at Algonac, Mich. (above). If you hurry, you can be the eighth satisfied customer. Three Diesel engines give model at right a cruising speed of 20 miles an hour.

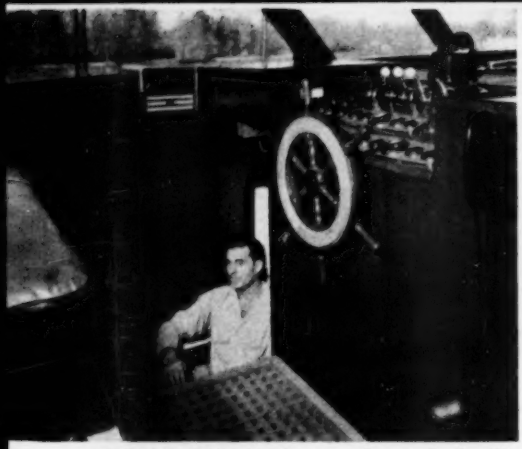
63-Foot, 22-Ton, 3-Engine, $121,750 Cruiser Is

World's Biggest Motorboat

IF YOU want to sail away to that desert isle and beat the high cost of living, here's a boat you can step up and buy with your last $121,750. It's the 63-foot flagship of a fleet of 123 models turned out by Chris-Craft, which calls it the world's biggest motorboat to be built on a production-line basis. And at least seven customers so far have paid the price and cruised away in luxury.

Cradled above a double-planked mahogany bottom, three 200-horsepower Diesel engines give the 22-ton craft a cruising speed of 20 miles per hour. In addition, the big engines supply power for a combination generator which feeds 32-volt current to standard marine appliances, and 110 volts to such landlubber gadgets as electric razors and lamps.

Above the engine room are four deck



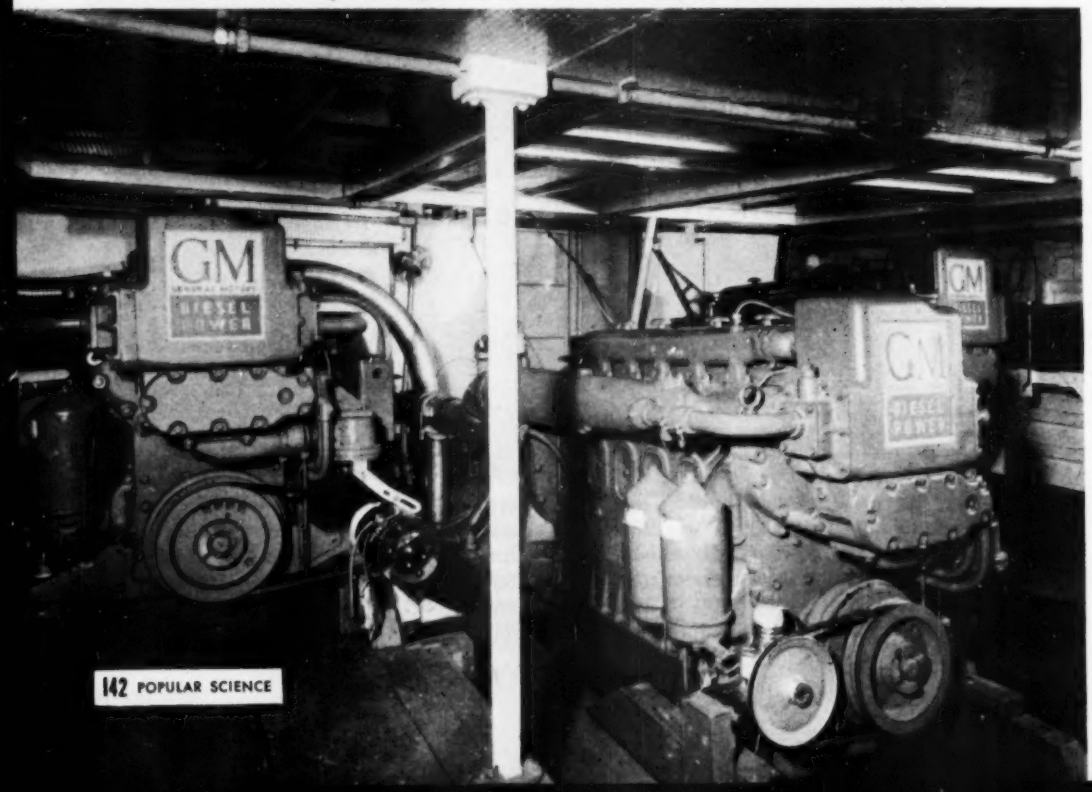
SKIPPER'S CONTROLS feature electric-hydraulic clutch shifts. Telephone is strictly for local calls: "Send up another bucket of ice, and tell Wilmot his ukulele is off-key."

LIKE THE SMELL of galley cooking? Then you'd better go aloft, where kitchen fumes are blower-blasted as they leave a four-burner gas stove. Hot and cold running water? Naturally.

levels. Crew quarters, galley and knotty-pine-paneled dinette occupy the bow section. Behind them and three steps up, is the broad-windowed main salon, connected by short companionways with the enclosed bridge and sun deck above, and staterooms and baths below.

The "63," which sleeps 13, is a far cry from the modest line of duck boats with which C. C. Smith launched Chris-Craft back in 1900. C. C. Smith is short for Christopher Columbus Smith—a fitting handle for a boat-builder. But the Santa Maria was never like this.

GASOLINE OR DIESEL power plant is optional. But who cares? Soundproof engine room makes either type so quiet you'd think you were back in your old canoe—or are you?



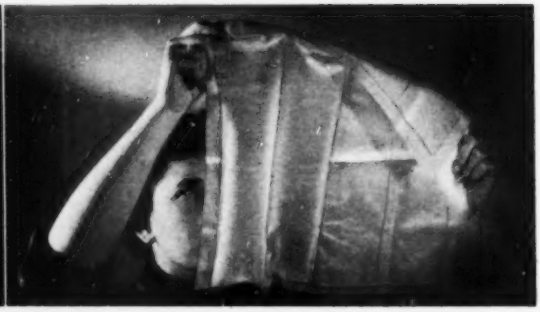
SURPRISE! You never know what's back of the blond woodwork. In this case it's the steward, ready to supply the skipper's guests with liquid refreshments through a fancy drop door.

PLASTIC-TILED SHOWERS are for sure-footed guests. There are also four bathtubs for those who prefer to take their Cape Hatteras ablutions sitting. No swimming pool, though. END

New Aids to Fishing

1. Folding seat doubles as a kit bag to tote fishing gear and the day's lunch. The 2½-pound aluminum frame can support 300 pounds. Two large zippered pockets running the width of the chair and four smaller snap-fastened pockets keep everything within reach.

4. Bait box has loops at the back so that it can be worn on a fisherman's belt. There are two covered compartments—the one at the front with perforated lid holds bait, the other stores hooks and leaders.



5. Cushioned comfort while sitting out those hours in a rowboat is provided by this air pillow. A few huffs and puffs blow it up. Deflated, the Pocket Pillow folds into a square no bigger than a wallet.

2. Fish shears snip off tail and fins, then come apart to scale, lay open and clean a fish. Handles also serve as hook extractor, screwdriver, hammer, pliers and bottle opener.

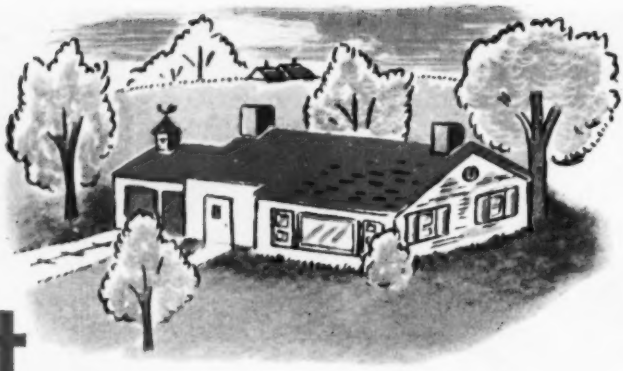
3. Drier for boots is made of aluminum, can be set over a warm radiator or camp stove. The two boot holders are chimneys that feed in warm air to get footwear dry in a hurry.

6. Folding camp gear for fishing and hunting trips subtracts pounds from a pack, reduces bulk in a car. Available now are a gallon water bucket, dishpan, wash basin and drinking cup all made of Vinylite.

7. Capacious creel with washable lining holds a limit catch; five small pockets carry everything for netting them. There's also a detachable bottle for fly dressing and a landing-net ring on the shoulder strap.

Further information on these products can be obtained from: 1. Universal Converting Corp., New Bedford, Mass.; 2. The Village Store of Lake Placid, Inc., Lake Placid, N. Y.; 3. Kinox Co., 103 Wales St., Rutland, Vt.; 4. Palmer Products, Sexton Bldg., Minneapolis; 5. Majestic Gifts Co., Box 1447, Beverly Hills, Calif.; 6. U. S. Fiber & Plastics Corp., Stirling, N. J.; 7. Perry Products, Box 368, Peterborough, N. H.

How to Pick Your Lot



The site of your dream house is as important as what you build on it. Here are 12 tests you can apply before you sign.

By George C. Johnson

GETTING the most for your money in buying land for a homesite calls for planning the lot.

This can be more serious than it sounds.

If your lot is not planned as carefully as your house, considerable value may be subtracted from your property as a whole.

In 35 years with an institution primarily devoted to the care of peoples' savings and their home investments, I have seen my share of near-tragic mistakes made by building the wrong house on the wrong land.

You have often heard that the purchase of a home is the largest single investment in the average man's lifetime. To be careless about the location of that home can undermine much of the attractiveness of your investment.

THE AUTHOR of this article, George C. Johnson, is president of the Dime Savings Bank of Brooklyn, which makes more home mortgages than any other savings bank in the world.

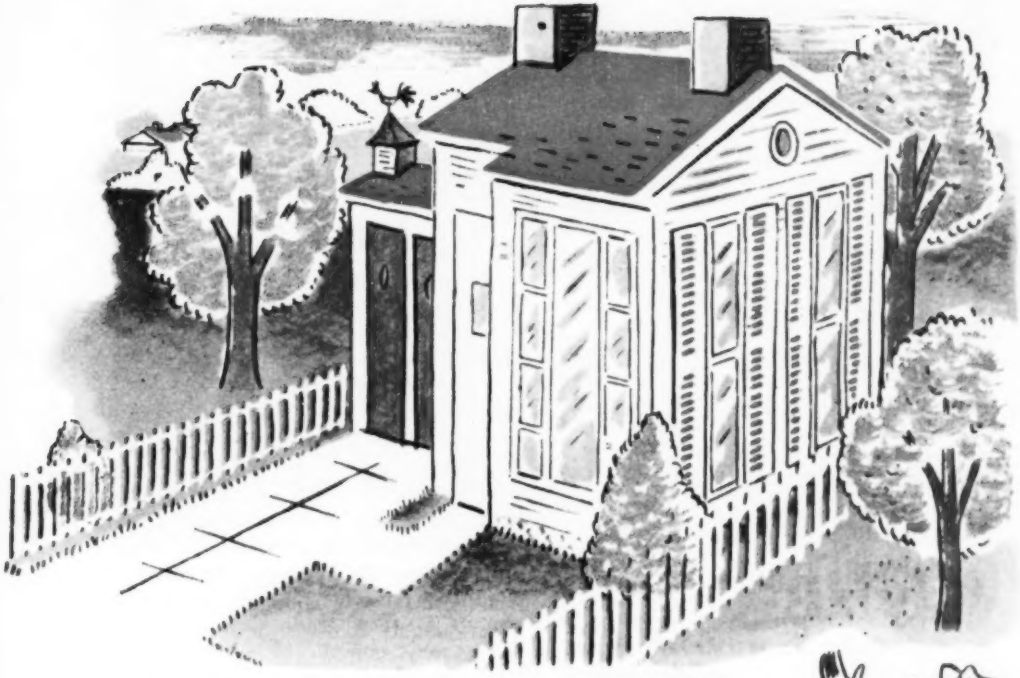
It is easy to understand the fundamentals involved in the selection of a good homesite. They boil down pretty much to common sense. The most important thing about these factors is to keep them in mind and not forget them in haste and enthusiasm over some glamorous architectural detail.

Of course, the man who finds a ready-built house to suit him—a house erected by a successful merchant builder—may be spared much of this responsibility. Shrewd home developers today place great stress on community planning, on orientation, good drainage and sound values in general. But the man who builds his own house, or wants his house built for him, can best get his money's worth in land by figuratively putting his lot in a test tube.

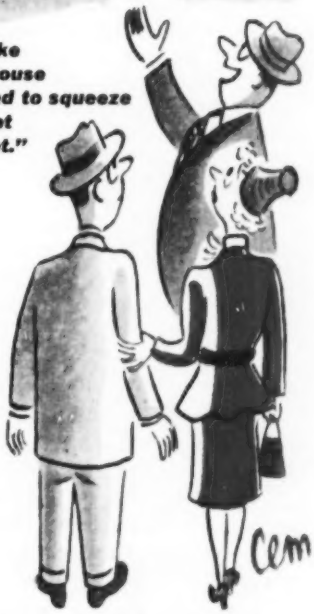
Here are 12 practical tests you can apply:

✔ TIME TEST

Are you ready to plan your home and build it? Or are you dreaming of the future? To pay taxes for years on unused land will not help you save toward your house. Vacant lots usually do not increase in value enough to offset ac-



cumulated taxes. Your money may earn more for you in your savings bank or government bonds. Land styles change along with house styles. The time to buy a homesite is when you and your architect can plan your house and land together.



"Sure it's like the Jones' house —we just had to squeeze it a bit to get it on your lot."

✔ PRICE TEST

An old and tried rule is to keep your land cost around 20 percent of what you plan to spend for the entire project. To venture too far from that mark may detract from the ultimate value of your property. A modest house on expensive land or a luxury house on cheap land will not have the best resale value—something you or your heirs may someday be concerned with.

✔ SIZE TEST

The right-size lot is very important. Rambling modern homes call for wider lots. Yet, a lot too large may call for the help of a gardener. Fit your lot size to your spare time and pastimes. It should be big enough for enjoyable outdoor living without too much upkeep; it should be small enough for attractive landscap-

ing without spending too much money.

✔LOCATION TEST

Will your homesite be convenient to schools, stores, churches and recreation? Will established fire and police protection add to your peace of mind? Too much isolation can mean long auto trips for groceries, prospects of being snowbound in winter, fire hazards.

✔CONVENIENCE TEST

Nearby transportation shortens your work day. It is an appreciated asset in bad weather. But too much transportation on a heavily traveled highway can be a drawback. Traffic hazards for children, noise and fumes may detract from such property. Noise and smoke from nearby railroads affect home values.

✔NEIGHBORHOOD TEST

You don't want to keep up with the Joneses. Or be dragged down by somebody else, either. A neighborhood of families in your own class means more congenial acquaintances and a happier environment for your children. A built-up neighborhood protects land value.

✔ZONING TEST

Is your lot in an area restricted to residential use? This can protect your home value against undesirable encroachments —factories, taverns, gasoline stations, shopping crowds.

✔HIDDEN-COST TEST

Look for paved streets, curbs, storm sewers, sidewalks and utilities already installed and paid for. These will spare you from special assessments at a time when your budget may least stand an added burden. Fire hydrants mean water supply and lower fire-insurance rates.

✔TOPOGRAPHY TEST

Have a topographical survey made. This enables you to know your land. Have test borings made. Rock outcroppings or concealed rock ledges may make excavation prohibitive. This may mean the end of any dreams of a basement hobby room or basement workshop. A level lot minimizes grading and erosion problems. A sharply sloping lot is usually more expensive to build on, more expensive to landscape and maintain.

✔ELEVATION TEST

A homesite on a hilltop, if not too inaccessible in slippery weather, can have advantages of good drainage, a dry basement, a good view and cool breezes. A lot at the base of a hill may risk floods, wet-basement problems, oppression in hot and humid weather.

✔DRAINAGE TEST

Well drained soil makes landscaping and gardening easier, minimizes mildew and fungus annoyances. Drainage is simplified on a lot sloping up from the street. A steep grade down from the street may complicate sewer connections, prohibit basement plumbing. But there are some advantages in any sloping lot. One is the ease of accommodating the garage in the basement. Another is a possibility of large basement windows on one side of the house.

✔NATURAL-ENDOWMENT TEST

Spare the trees. It takes 100 years or more to grow good-size oaks and other hardwoods. The shade, windbreak and beauty of tall trees add to any homesite's value. Such a natural heritage can be a definite boon in orienting your house—placing picture windows where they will frame natural pictures; shading living room and kitchen from the hot afternoon sun, while letting the bright morning sun stream into bedrooms and breakfast nook.

Some people picnic on their lots before planning their homes. In this way they can test sunlight and shadows at various hours of the day.

Of course, compromises always are in order, but you should get the most for your money if your lot rates high. END

Designer Pokes Fun at the Dream Cars

WORKED up as a gag, this car has a bug eradicator (spray gun) and a "chrome" bumper of cooking pans on the front. A roving eye follows passing gals, chicken-wire wheels hold live chickens and peach baskets with suspended cushions form "bucket" seats. The engine pops corn or fries eggs. The car was dreamed up by Raymond Loewy (left), who is shown explaining it to Studebaker's president.

Trailer Hitches to Motorcycle

A TWO-ROOM trailer for motorcycle fans weighs only about 500 pounds. It has a kitchen and a bed-sitting room with two berths. The center section of the roof can be raised to give more ventilation and head-room. The Chaletvan is made in England.

Hay Loader Bolts to Truck

A WHEEL rolling on the ground furnishes the power to operate the hay loader above, which bolts onto the side of a farm vehicle. The fork picks up a bale when nosed into it, then raises it to the bed of wagon or truck. The Snow Corp., Omaha, makes it.

I'd Like to see them make...

Everyone has his own pet idea of some gadget he would like to see in general use. What is YOURS? *Popular Science Monthly* will pay $5.00 for each one published. Use government postcards only. Contributions cannot be acknowledged or returned.

A GAS PUMP that would register the sale on a tab of paper (like a cash register) so the motorist could keep a record of the gas he uses.—*Ben J. De Leno, New Rochelle, N. Y.*

A BABY-CARRIAGE LIGHT for greater safety at street crossings when it was growing dark. It would also light up curbs and obstructions. —*James Philpott, Union City, Mo.*

AN ALARM CLOCK with suction cups on the base, so you would not knock the clock off the night table when you reached out, half awake, to turn it off.—*Mrs. Michael Fey, NYC.*

A RADIO OUTLET at each seat in long-distance buses. The occupant could plug in headphones and listen without disturbing other passengers.—*N. Carlson, Iron River, Mich.*

COMBINATION LOCKS for car door and ignition to do away with the inconvenience caused by forgetting or losing your car keys. —*Luculus Humphrys, Great Falls, Mont.*

Refurbished by master craftsmen, the 192-year-old State Coach will add its historic glitter to the coronation.

They're Modernizing the Queen's Coach

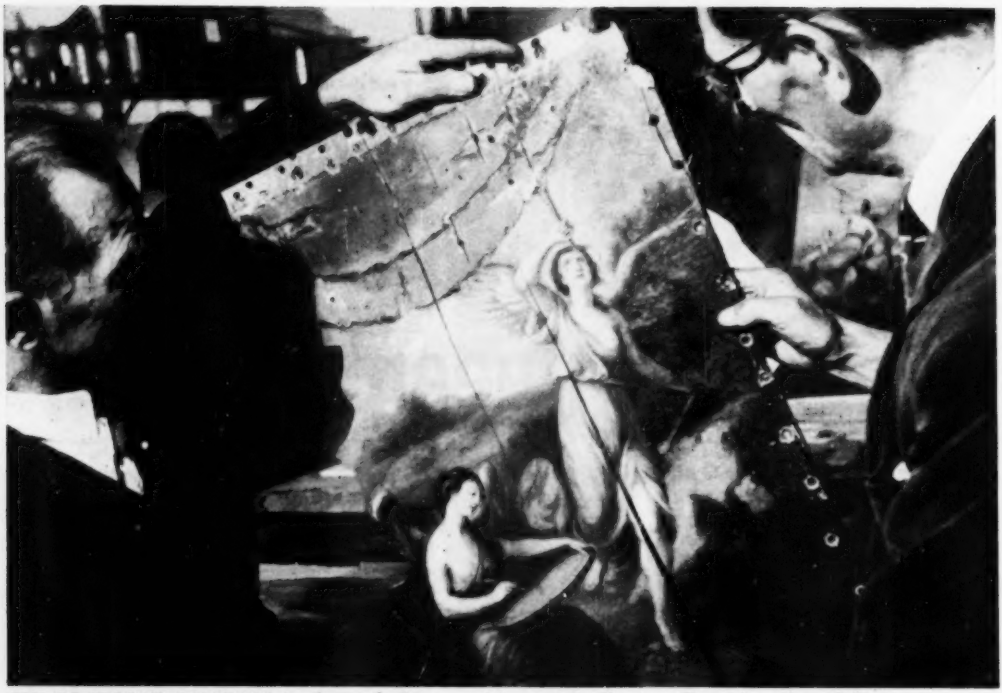
By William McGaffin

THE golden State Coach that will carry Queen Elizabeth II from Buckingham Palace to her coronation in Westminster Abbey on June 2 is a thing of costly beauty that has just undergone another face-lift.

It's an old British custom to spruce it up for each new coronation. For the new Queen they have:

- Installed fluorescent lighting to illuminate the gloomy interior so that the public can get a better look at the Queen. It is battery-operated.
- Fitted hard-rubber tires to the huge old wheels—the back ones are six feet

WORKMEN WRESTLE with four tons of royal coach that has just been repaired for Elizabeth II's coronation in June. Affectionately called "Old Rattlebones," it rides hard.



ONE OF CRACKED PAINTINGS is shown before restoration. It portrays History recording the reports of Fame. To restore paintings, craftsmen first attached painted sides to work boards with special adhesive. Then they shaved down old wood on back to a fine veneer. After that, remainder of wood was removed, splinter by splinter, with surgical scalpels.

tall, the front ones three feet six inches. ● Transferred eight art masterpieces on the outside of the coach from their original wood panels, which were beginning to crack, to new ones.

Hooper & Co., a well known firm of carriage builders, and William Drown, picture restorer to the late king, collaborated on the job.

Coach Made Queen Victoria "Seasick"

The heavily gilded coach isn't sprung like a Cadillac. It rides like a lumber wagon. Queen Victoria complained that it made her "seasick." That's the reason for the rubber tires. The rebuilders didn't consider it practical to remove the wheels' iron hoops which were fitted and bolted on in 1761 when the coach, two years abuilding for George III, was completed. So the new tires were mounted right over them.

The rubber will make braking easier. The coach is braked by an attendant walking behind. When he turns a handle, brakes—yes, like those on a lumber wagon—are forced against the rear wheels.

Even with these tires, the coach will jounce. Its curious springing remains unchanged. The body is slung cradle-like between four large Tritons—figures of sea gods. One on each corner, they support the body with steel suspenders that run from their shoulders.

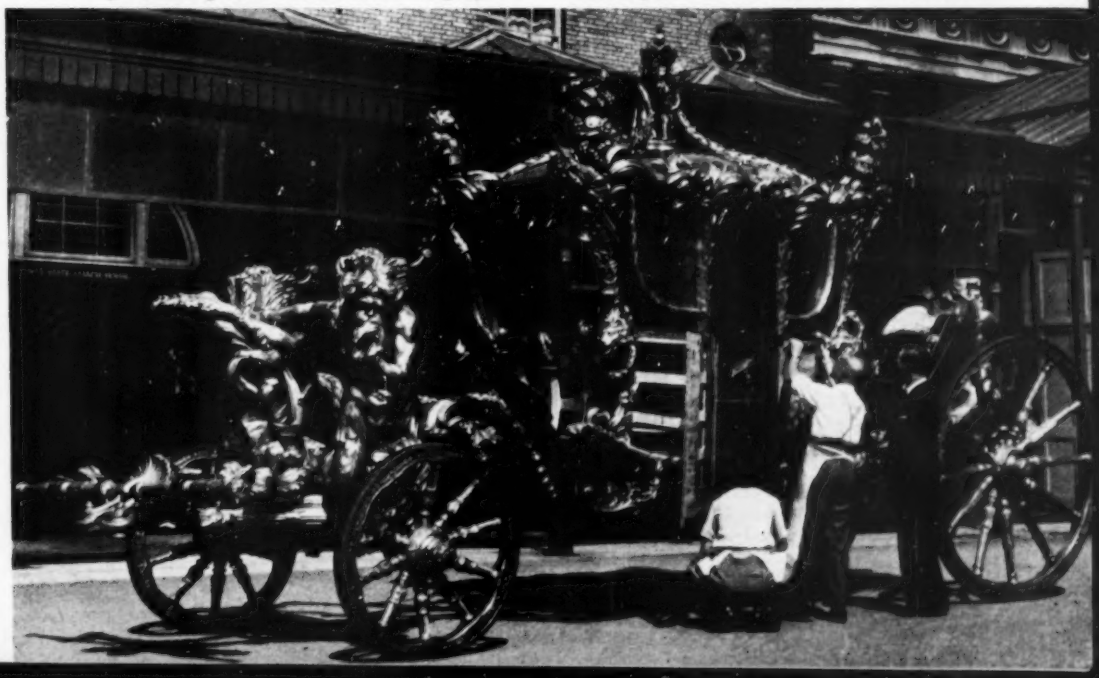
The delicate task of transferring the pictures to new panels was begun before George VI, Elizabeth's father, died. It took six men an entire year to complete—just why, is explained in the accompanying pictures, taken during the filming of a movie, "Royal Heritage," by London Films International.

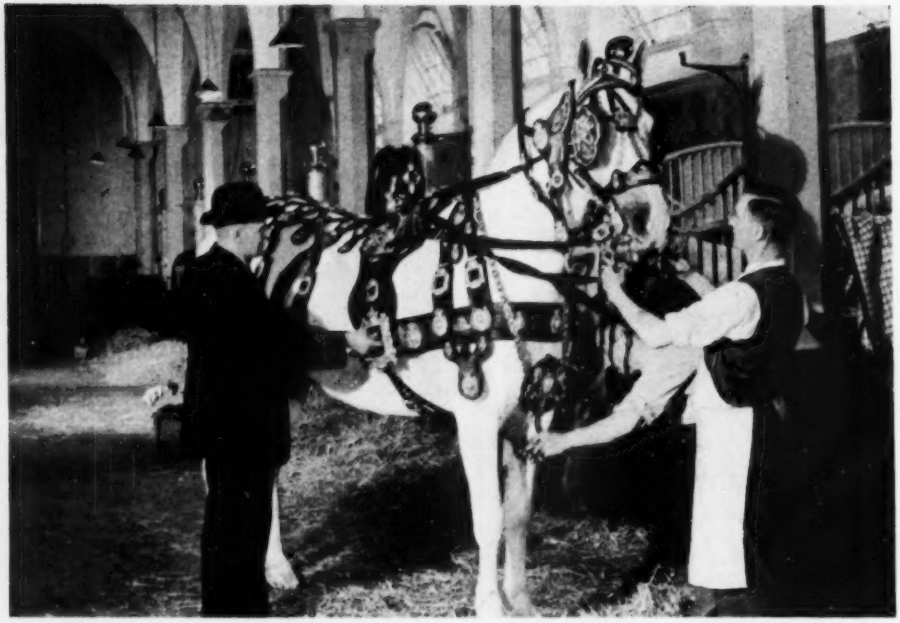
Giovanni Cipriani, an Italian artist, painted the panels in 1761. He was paid

OLD WOOD is in final process of removal here. Workman uses magnifying glass to guide knife. Wood backing was replaced with silk, and painting gently stripped from adhesive.

SILK-BACKED PAINTINGS were finally mounted on new panels of laminated wood. They were re-attached to ornate coach with screws. Artist is touching up breaks in painted surface.

RESTORED COACH gets final touch-ups. Wheels, grown elliptical from coach's weight, were coated with plastic and then ground down to round again before rubber tires were attached.





Snow White, one of coach's eight horses, gets dress-rehearsal harnessing in the Royal Mews.

315 English pounds ($882 at today's rates). Now they are valued at $280,000. Three are on each side of the coach, one in front and one in back. They are filled with ladies so bosomy that they distressed the prim Victoria.

Inside, the coach is lined with red satin. A semicircular step by each door folds into a recess in the floor when not in use. There are only three windows.

Doors Must Be Opened from Outside

A man to open the door for the Queen is an absolute necessity. There's no inside door handle. The footman assigned to this job has to know how to do it. The doors won't open until the window has been lowered. The leather straps controlling the windows must be worked from the outside, too.

Years ago a policeman who didn't know the secret yanked on a door while the coach was parked behind the Houses of Parliament. The entire pane spilled out in a shower of splinters.

The coach has been altered little in its almost 200 years. Forty-odd years ago its wooden axles were replaced with steel. Fifty-one years ago its box seat for the driver was removed. A postilion on the leading team of horses drawing the coach now guides it.

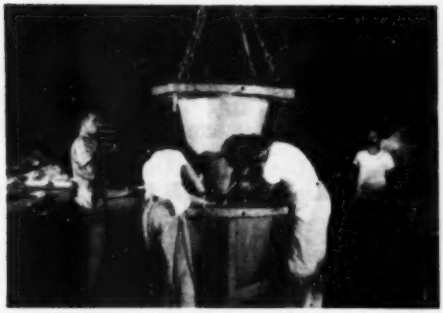
It's an "Eight-Horsepower" Vehicle

It takes eight horses, hitched up in four teams, to pull the coach. Eight "walking men" plod alongside it in case anything goes wrong. There is an escort of six footmen and four yeomen of the guard (the famous beefeaters from the Tower of London).

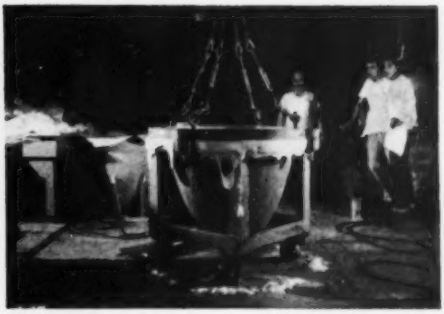
Elizabeth II will be the seventh British sovereign to ride to a coronation in the golden coach. If she knows her British history—as she undoubtedly does—she knows that George III paid the staggering sum of 7,587 pounds 19 shillings nine pence ha'penny for it. That's $21,246.37 at present rates but represented a lot of money then.

The cost of fixing it up for the approaching coronation has been estimated unofficially at just about what it cost originally in today's pounds—$21,000. END

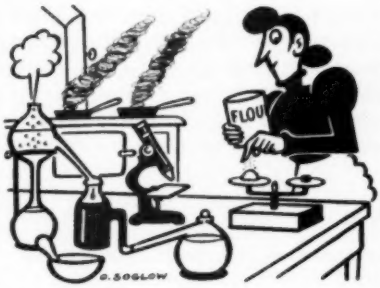
They Now Bake Airplane Parts Like Cake



1 A FOAMING PLASTIC that looks like cake dough can be baked as soft as sponge rubber or hard enough to form radar housings as shown in these photos. The workmen above are pouring the goo, called Lockfoam, into a female die between two sheets of glass-fiber cloth. Both dies are preheated to 120°.



2 MIX RISES like a cake, filling every nook and cranny, seeping over like batter. Foaming reaction produces heat greater than 200°. Once set, solid gives strength and stability to cavities and shock-absorbing structures, insulates against heat, cold, sound, vibration and electricity.

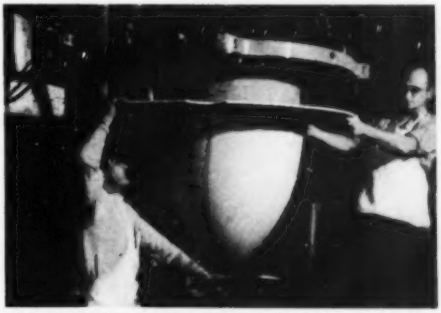


75 years ago this month

Popular Science Monthly reported:

"NOW that ladies are to be admitted to all the degrees of the University of London, we hope the Senate will see fit to add cooking to the list of subjects for the Bachelor of Science. Even the best of our cooks seem to go right rather by intuitive talent than by any exact knowledge. In the cookery-book of the future, however, we may hope to see milligrammes and cubic centimetres replace the less exact measurements to which cooks have been accustomed."

3 COOLED AND SET after six hours of curing, radome is lifted out with the male die.



4 HARDENED RADOME is pulled from die by Lockheed workmen, ready for trimming.

Your Brain Is Like a

Recent research has partially

By Bruce Bliven

HOW do people think?

What is the physical process involved in reason and memory?

How are we able at will, and almost instantaneously, to summon up hundreds of mental images of places seen and people encountered, perhaps scores of years ago?

Because of brilliant laboratory work carried on in recent years in half a dozen countries, we are beginning to be able to answer these questions. Hard as it may be to accept such an idea, your body contains what is in substance a wet-cell electric battery, generating a direct current

ELECTRICAL IMPULSES in your nerves and brain move less rapidly than those in your telephone. But the brain is a more complex thing than even the greatest of our telephone exchanges and computing machines.

Wet-Cell Battery

explained the miraculous way men remember things and think.

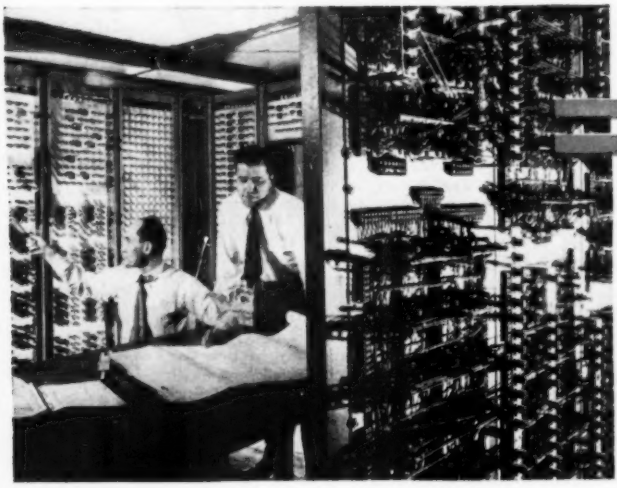
of about a tenth of a volt or roughly a twentieth as much as an ordinary flashlight battery. The electric charge is created by two body chemicals, sodium and potassium, operating on nerve tissues bathed in a fluid that is chiefly water, with minute quantities of other substances included.

Five parts of the body are involved in this electrical process. The *nerves* are threadlike fibers that extend to every part of the system and carry impulses to and from the main "message centers," of which there are four. The *spinal cord* is about 18 inches long, and the top end spreads out inside the skull into a bulb-like part of the brain known as the *medulla oblongata*. Above this is the *cerebellum,* shaped roughly like half a boiled egg sliced lengthwise with the flat side down. Above and in front of this is the much larger mass of the *cerebrum,* of a roughly similar shape. Its surface is convoluted and folded into a mass of corrugations over which spreads the gray matter, a fairly thin layer of cells spread out over the cerebrum and going down into all the folds.

Brain Cells Weigh Little

The entire nervous system—including brain, spinal cord and nerves—weighs about three pounds in the average adult; but the cells in the gray matter, which are the seat of memory, reason and all the conscious faculties, weigh only a few ounces. Into that small amount of tissue are crowded about 15 billion microscopic cells—give or take a billion or so—which are or can be connected and cross-connected, like an electric switchboard, in countless combinations.

The electrical process mentioned above is not a continuous, steady production of current. Rhythmic pulsations, which might be compared to sheet light-



THE BRAIN is often compared to an electric computing machine; but a computing machine as complicated as your brain would require a five-story building many blocks square, solidly filled with mechanism, and would need all the water of Niagara to cool the necessary tubes. Warren S. McCullough of the University of Illinois Medical School has calculated that the biggest computing machine ever constructed may be about equal to an ant's brain.

ning, sweep over the nervous tissue; when you are asleep they slow down and almost disappear, but with the slightest stirring of intellectual or even physical activity they speed up and may go as high as several hundred pulsations per second. In addition there are special currents created by special conditions. If, for instance, you touch your finger to a hot stove, an incredibly complicated mechanism comes into play and flashes the signal to the appropriate message center.

There the problem is weighed, a decision as to the best course of action is arrived at, and the appropriate message is telegraphed back through the nerves, ordering the tendons and muscles to contract and get that finger off that stove, but quick.

The whole round-trip process takes only a fraction of a second.

Luckily, your nerves are equipped with a series of booster stations, just as a telephone wire between New York and San Francisco has a series of relay points where the current is magnified. For the electric current set up when you put your finger on a hot stove is so weak that left to itself it would die out after moving about a fifth of an inch. After the finger has been snatched away from the stove, perhaps to a distance of a foot or so, another equally elaborate mechanism is invoked to *stop* the movement; otherwise it would continue until your arm was stretched out as far as it could go. (Every movement of your body is under this constant dual control.)

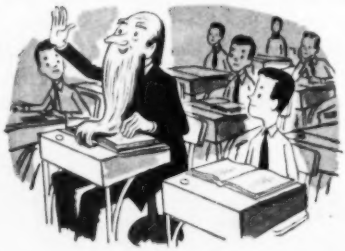
Newborn Baby Has All His Brain Cells

When you are born you already have your 15 billion brain cells, called neurons, that are your lifelong equipment. Every subsequent growth of the brain is an enlargement of its non-nervous tissue only. Though these cells are very sturdy,

What Constitutes Genius?

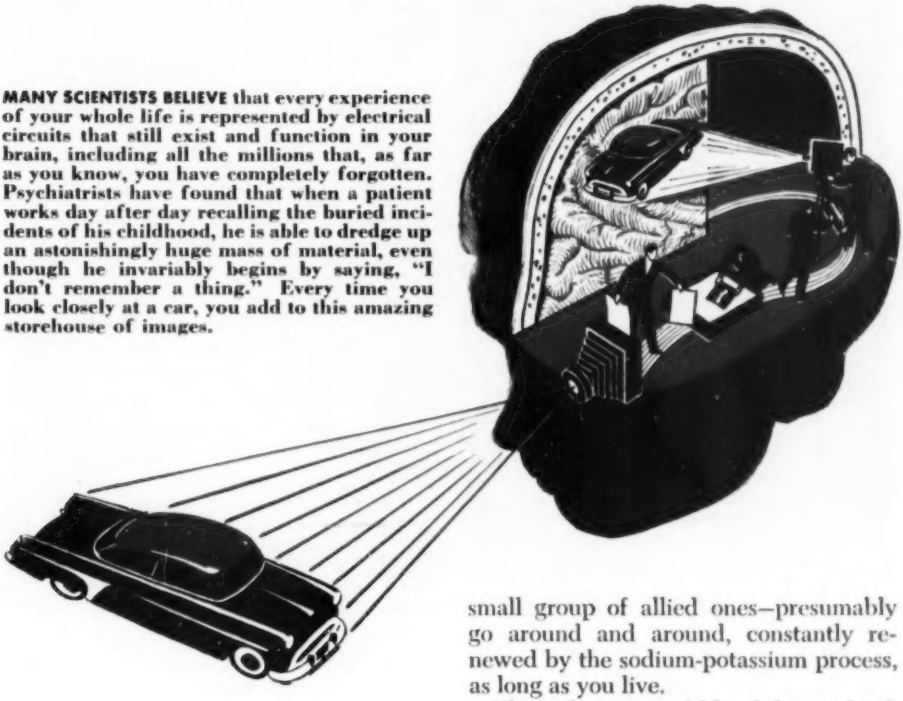
There is a popular myth that high intelligence is correlated with a large brain or one with an unusual number of convolutions; but the scientists have no evidence that this is true. Presumably the highly gifted person has brain cells that have never been injured by accident or diseases, with a good flow of blood and oxygenization. He may have some inborn capacity to coordinate his electrical circuits unusually well. Of tremendous importance is what a person, genius or otherwise, does with his electrical circuits in the way of reading, observation, experimentation. We can't all be geniuses, but 999 out of every 1,000 of us could make much better use of our mental equipment than we do.

When Are We Too Old to Learn?



The answer is: never. The learning process is associated with the ability to create new reverberating electric circuits in the brain, and as long as that power remains, you can continue to acquire new knowledge and skills. Damage to the brain cells can take place at any age; there is no necessary correlation between such damage and any particular span of years. In other words, learning ability is strictly an individual matter. Plenty of people possess the neurons and the other necessary equipment to learn to speak a new language at 90—or to acquire new skills. Plenty of them have done so. The only way to find out the condition of your electrical circuits, at any age, is to try.

MANY SCIENTISTS BELIEVE that every experience of your whole life is represented by electrical circuits that still exist and function in your brain, including all the millions that, as far as you know, you have completely forgotten. Psychiatrists have found that when a patient works day after day recalling the buried incidents of his childhood, he is able to dredge up an astonishingly huge mass of material, even though he invariably begins by saying, "I don't remember a thing." Every time you look closely at a car, you add to this amazing storehouse of images.



the normal wear and tear of the years will somewhat reduce both their number and their efficiency in transmitting signals. When you are born, the electric pulsations are already sweeping through your brain and nervous organization, but most of the cells might be said to be blank. Little by little, sensations from the outside world, transmitted through the senses, begin to register among the cells of the brain.

How is this done? Electrical engineers speak of a closed or reverberating circuit, one in which electricity goes around and around in a loop. A popular theory is that every memory you possess may be carried in the form of an electrical impulse traveling around a loop of at least a few and perhaps many cells in the brain. Each of these cells is capable of putting out two tiny tendrils, which hook up with the tendrils of two adjacent cells and serve to transmit electricity. The electrical charges representing one memory—perhaps a single image or a small group of allied ones—presumably go around and around, constantly renewed by the sodium-potassium process, as long as you live.

Through its incredible ability to hook one reverberating circuit into another, hundreds or thousands of times in a fraction of a second, your brain is able to bring together into one grand circuit many or all of the data needed to make correct decisions. To be sure, such a system is not infallible; sometimes you interpret the data wrongly; but *the more you know, the less the chance that you will make a mistake.*

Senses Report Everything

All this is amazing enough; but the process is even stranger still. Your senses report, automatically and continuously, everything that you see, touch, hear, smell or taste. This avalanche of impressions from the external world would overwhelm us, were it not for a further refinement. At many points in the nervous system there are tiny gaps called synapses. The electrical impression from any one nerve fiber is not strong enough to form a spark and jump across one of these breaks; but a large number of fibers

AT MULTIPLICATION, machines like GE's OARAC beat people easily—Connie Hodgson (above) erred by a trillion. But no computer can match humans' memory or moral judgment.

transmitting simultaneously as a bundle can do so. This means that we are insulated from the unendurable distraction of noting every one-degree change in temperature or the alterations of sunlight from moment to moment on a day of intermittent clouds, and a multitude of similar things.

A good example of this protective mechanism is the eye. The retina, at the back of the eyeball, has about *100 million* light-sensitive cells, each of which is capable of transmitting an impression; but there are only about one million nerve fibers leading back into the brain. This means that 100 cells are competing for every fiber. Any impression has to be strong enough to command the response of at least 100 cells before it gets back into the brain at all.

Functions of Brain

This enormously complicated nervous machinery is only a part of the functions going on continuously in the brain and the spinal cord. Think of 1,000 telephone switchboards, each big enough for a city like New York, going full tilt receiving and transmitting requests, questions, orders.

In one part of the brain orders go out every fraction of a second, day and night, to regulate the pumping of the heart. Another nearby section tells the lungs to breathe. Elsewhere digestion and elimination are controlled, pores are opened or closed to suit the temperature, your pupils are dilated or contracted in accordance with the light.

Each part of the brain receives and acts upon messages appropriate to its special functions. An automatic reflex action that can be performed in your sleep without awakening, like withdrawing your foot when it is tickled, might be handled by the spinal cord alone. Jerking your finger away from the hot stove, a more serious matter, might be a task for the medulla oblongata. This organ also takes care of automatic functions like breathing and the movement of the heart.

The lower and smaller part of the brain, the cerebellum, is to some extent, a duplicate, or spare, for many of the functions of the cerebrum. It also controls the voluntary action of the muscles, partly on orders from the cerebrum. The cerebrum in turn is the seat of consciousness, memory, reason—in short, the human personality.

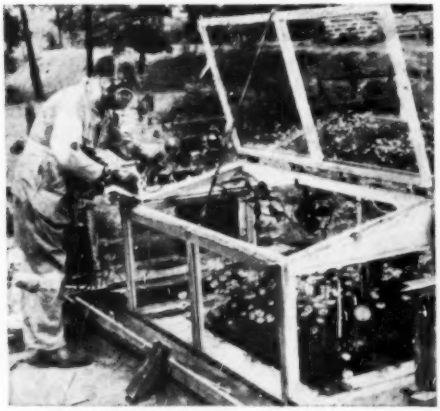
Brain Functions Duplicated

Nature, with excessive caution, has duplicated the functions of each part of the brain in other parts to an amazing degree. Laboratory animals are able to perform many acts when the higher brain centers have been almost completely removed. Human beings have also functioned well with part of the brain tissue lacking. Louis Pasteur, the famous French scientist, suffered a cerebral hemorrhage as a result of which it has been said that "he had only half a brain," yet he went on after this to do some of his best work. In many cases, messages go simultaneously to more than one of the four main parts of the nervous system.

[*Continued on page 254*]

Playing with Blocks Helps Couple Plan Dream House

If you're dreaming of a new house, you can work out what you want with the interlocking toy bricks above, building up, tearing down and rebuilding a model on the kitchen table. Architects are using the kit, too, to show folks a real house instead of confusing blueprints. The Brick Town kit is made by Plastic Block City, Inc., Chicago.



He's Picking "Hot" Flowers

Yessir, that's a gardener above. He's wearing protective clothing to pick flowers from plants that breathed radioactive gas during growth. "Hot" juices extracted from the pyrethrum plants are used by Gulf Oil scientists to trace how insecticides paralyze and kill flies and garden pests.

Machine Delivers the Milk

Apartment houses are getting mechanical milkmen. A refrigerated vendor that holds 140 cartons can serve two customers at a time. The machine is stocked by regular route men but the price of a quart of milk is less than for doorstep delivery. Rowe Mfg. Co., NYC, makes the vendor.

German Rescue Cruiser Carries Dry Dock for Motor Launch

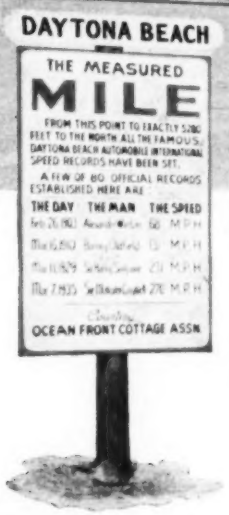
MOVING within range of a ship in distress, this German rescue ship releases an auxiliary motor launch from a cradle in its stern. Used to run lifelines to the stricken ship, the launch slides backward into the cruiser's wash, where it is less apt to capsize or smash against the sides of the mother craft. Named the *Bremen,* the 37-foot cruiser carries the German Red Cross on its bow and pilothouse.

Dirigible Windows Catch Light, Duck Sun

BECAUSE South Carolina summers are glaring hot, windows in the new Spring Mills office building at Fort Mill slant sharply inward from overhanging floors above. This minimizes direct sunlight, resulting in a 10-percent reduction in air-conditioning costs. In addition, freedom from reflections makes the glass almost invisible. Human-fly window washers aren't needed—each pane flips over for easy cleaning from the inside.

The rooms have angled wall sections above the sloping windows to act as light reflectors. The effect is bright and airy, suggesting the interior of a dirigible cabin. This isn't surprising, since the design came from the mill president's recollection of the banks of inclined windows in the German dirigible Hindenburg.

1953 Cars Shatter Speed Marks



NEW STOCK RECORD of 113.28 m.p.h. on Daytona Beach was set by Bob Pronger, here finishing north run at 115.34.

Beefed-up sedans in stock-car races absorb more punishment in 100 fast miles than you may give your automobile in a year's driving.

By R. P. Stevenson and Harry Walton

PLENTY of Americans are going to shop for their next new cars with an eye on stock-car racing. This fast, tough, popular sport, they believe, shows up a car's guts as no ordinary driving would.

Are they right? What do stock races tell about the car a dealer turns over to you at his showroom door?

Some time this summer or fall you may be able to judge for yourself. Still growing fast, stock-car races will be run this year in 100 or more localities.

The season began in Florida. In the measured-mile time trials that opened the series of Speed Week events at Daytona Beach, 10 '53 automobiles all beat the previous stock-car record of 100.28 m.p.h. set there in 1950.

New top man on the speed stretch was Bob Pronger of Blue Island, Ill., who averaged 113.28 m.p.h. for the two-way run in his 165-horsepower Oldsmobile Super 88. His time for the north run, ahead of a favoring wind, was 115.34. In the standing-start mile race, Pronger did 75.40 m.p.h. and won again. Other makes in the record-breaking 10 for the

SAFETY BELTS are fastened across drivers' thighs. They are bolted to car frame, not floorboard. Far from sneering at belts, drivers admit their worth, use them regularly in traveling.

FUEL TAKE-OFF on this car's tank is on right-hand side where gas is thrown on turns in closed-course races. Some drivers use heavy-duty tanks or add a center support strap.

flying mile were Cadillac, Lincoln, Hudson and Packard. Two 1953 Olds 88s, a 1953 Lincoln and a 1953 Hudson took the first four places in that order in the 160-mile stock race that wound up Daytona's big week of speed events.

These were regular hard-top models with hoods, fenders, bumpers and head lamps. Except for identification markings, they look much like the car in your own or your neighbor's driveway.

But Are They Stock?

Do these performance records tell you anything about your own car or the one you have been eyeing on the showroom floor? Yes, if you take certain important facts into account. It isn't likely that you could drive off in a '53 model and match such speeds, even after break-in. These winning cars were tuned to topnotch performance by mechanics who have lived with them for weeks. And they used stock parts that the average car buyer may not know exist. Once he does, he can order his car with the same.

"Stock" is defined by the National Association for Stock Car Auto Racing (Nascar) as applying to any part listed in the manufacturer's catalog for the year, model and type of car entered. Whether responding to demands from race drivers or quick to see the advantage of having their cars show up well on the tracks, the makers have come through with optional "stock" equipment that puts extra r.p.m. in the engine, besides adding to the safety of drivers and race spectators.

Nascar rules for stock cars, for instance, permit no altered or special camshafts. But Hudson, Lincoln, Olds and others offer, as optional equipment, "maximum-duty" camshafts that get more fuel into the cylinders sooner and that exhaust burned gases faster. If the maker of your new car lists such a camshaft, you can order one, too.

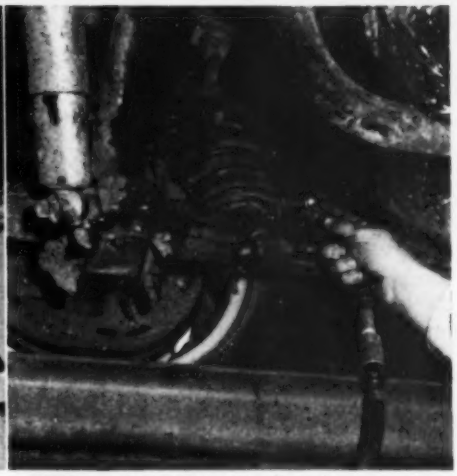
Hydraulic tappets aren't favored for racing, so mechanical ones are offered as optional equipment. High-compression heads are also factory options with some makers.

Aside from such optional stock parts, the rules permit few alterations in engines. Fans, fan belts and air cleaners may not be removed. Ignition systems, valves and carburetors must be stock. Piston stroke must be as specified by the manufacturer, but a maximum of .033-inch oversize in cylinder bore is permissible (you might get this in a regular overhaul). Radiators may be heavy-duty stock units with extra cooling capacity.

Generator and starter have to be in working order. Engines must be started as usual, not by pushing or towing.

Rear-axle assemblies with somewhat lower gear ratios than you'd normally get are also available from some makers

ROLL-OVER BAR, an extra support for roof if car goes over, is recommended but not compulsory in stock-car racing. This one, of welded pipe, is in Frank Arford's Olds 88.



RUBBER CYLINDERS—"windbags"—to stiffen springs are mounted between pads on rear spring and frame. Front ones fit inside coil-type springs. Inflation is five to 30 pounds.

as "production-option" items. They'll wind up the wheels faster at a given engine r.p.m., with some getaway loss.

Pronger's Olds had conventional shift, a heavy-duty camshaft and radiator, 8.5:1 high-compression head, mechanical tappets and a 3.42:1 rear-end ratio. He thinks 7 m.p.h. was lost by wheel slippage on the sand, and that the car could do 120 on hard roads.

Beefed-Up Parts for Safety

A year of highway driving may not punish your car half as much as 100 miles in a dirt-track race. When front wheels hit a deep-sand turn at 90 miles an hour, the wheel, spindle and steering linkage all take it on the chin. Parts you properly regard as good for the life of your car can give way under such stress.

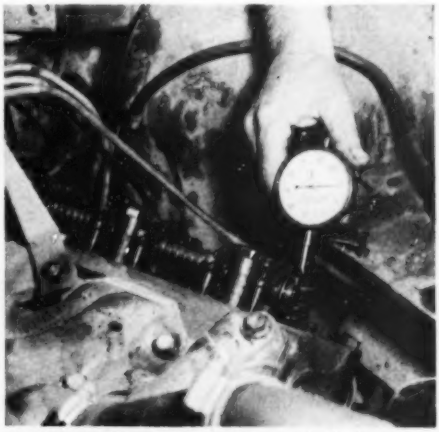
The story goes that one factory engineer was asked by a race driver who had just broken a wheel hub what he was going to do about it. "Nothing," the engineer said. "We aren't building racers."

But judging by the number of beefed-up stock parts offered by car makers, this isn't how most of them feel about it. And Nascar, with the aim of protecting drivers and the public from track accidents, has authorized the use of many optional parts for safety's sake.

Heavy-duty rear axles, wheels, hubs, spindle assemblies, suspension parts and steering linkage are among these beefed-up parts. Many makers have long supplied them for export cars, since roads and service are poorer abroad.

Stock racing quickly shows up the weak links in a production car, under conditions its average buyer would never encounter. Manufacturers are learning what parts can take it and which can't. Salesmen, ranchers and others who give a car hard service are also learning to take advantage of heavy-duty parts.

In at least one case a track failure of a wheel hub had prompt results on the production line. A dealer sent the pieces to



NASCAR INSPECTORS check camshaft for valve lift with dial indicator. Used with a degree plate, this checks valve timing, too. If off, camshaft may be pulled out for inspection.

the factory. The sharp corner in which the break occurred was changed in subsequent production to a fillet.

Even gas tanks are strengthened. With 160 pounds of fuel bouncing around as a live weight under the terrific bumps, turns and skids of racing, standard tanks have been known to split their seams and even pull loose from the mountings. That's one cause of track fires. Heavy-duty gas tanks are now available for some cars.

"Windbags" Reinforce Springs

Huskier shock absorbers and springs are authorized by Nascar if listed for the car by the manufacturer. Pneumatic boosters are installed in many cars instead. These are strong rubber cylinders, encased in a light coil spring (or in the regular independent front spring) and resting in rubber cups top and bottom. Inflated through ordinary tire valves, they can stiffen spring action to any desired degree.

In track racing, boosters are inflated to counter centrifugal force on turns. One driver, for instance, puts seven pounds in the left front booster, 25 to 30 in the right front, 14 in the right rear, and has no booster at all on the left rear spring.

The handsome wheels on your Jackrabbit Eight will take *anything* you can give them except a smashup. But on racing turns they have a bad reputation for breaking at the sharp radius of the inner flange, outside the bolt holes. Most drivers take advantage of Nascar's permission to reinforce the wheel disks with plates of quarter-inch steel, welded inside the rim and pierced for the hub and mounting lugs.

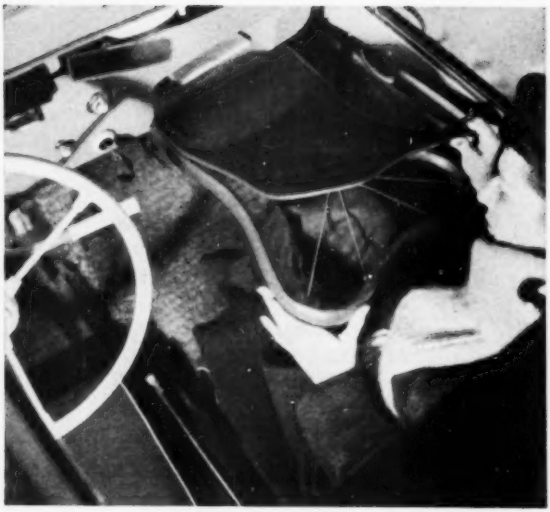
Stock hubs, which are commonly steel castings, may under Nascar rules be replaced with machined hubs. These are turned to the same specifications, bored out to fit the front-wheel bearings or the rear axle.

To compensate for the extra unsprung weight added by strengthening hubs and wheels, cars may be fitted with lighter standard balloon tires (which are still stock) rather than low-pressure ones. No special racing tires are allowed, but an extra-quality line offered by one maker is popular with drivers.

The Indianapolis Sound

One thing that gives stock-racing cars a few more miles than your own is a feature you can't imitate. Mufflers must be removed. Twin tailpipes extending past the body lead the exhaust out without back pressure. They also give stock-car races an Indianapolis sound—something that would make you unpopular with your neighbors and much too familiar to the cops. END

Pronger exhibits his winning 165-horsepower Olds. Increased power makes '53 cars faster.

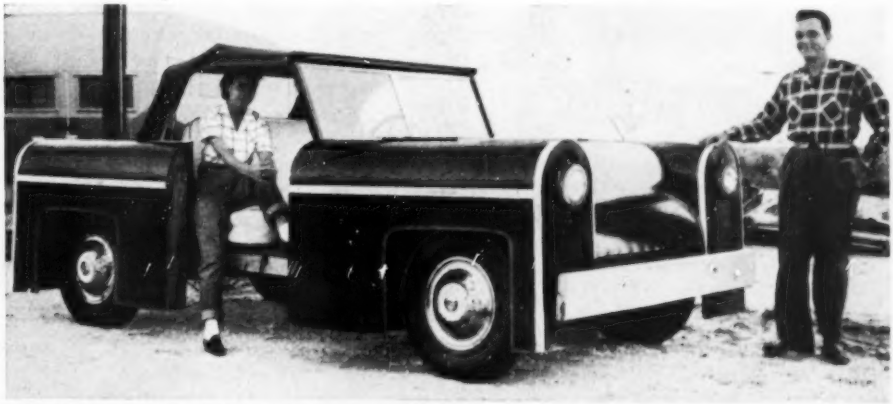


Crash Tray Protects Passenger

NEW crash protection is being provided for passengers who ride the most dangerous seat in today's motor cars—the one beside the driver. The device is a strong and flexible steel frame, covered with rubber, now being offered by a German manufacturer. Set like a tray on the lap of the passenger, with its leading edge attached to fastenings under the dash, or in the glove compartment, it prevents the rider from being pitched forward against the windshield.

Battery-Driven Pump Fills Tire

INFLATION is no longer a problem—for the motorist with a flat, that is. A midget air compressor which can be plugged into a car's electric system does the trick. A hose with a special hub connection feeds enough air into a punctured tire to maintain pressure until the car reaches a garage. The pump, which is being turned out by a British firm, is also handy for any other job around the shop which calls for a supply of compressed air.



Electric Car Built of Pinball Parts Runs on Small Change

ELECTRONICS engineer G. M. Powers Jr. drives 300 miles for 30 cents in this homemade electric car. Forward and rear speed controls came from X-ray and pinball machines, the motor from a 1915 Anderson Electric car. Fourteen automobile batteries supply current and must be recharged every 60 miles. Top speed is 30 miles per hour.

Saucers on Radar?

...an Expert's Verdict

Those blips on the scopes were as real as rainbows, and nothing new, says Harvard astronomer.

By Dr. Donald H. Menzel

DURING World War II, a cruiser in the Mediterranean suddenly noted a mysterious spot on its radarscope, within the range of its guns. A rapid check on the identification system failed to get any signal return, so the captain ordered the crew to open fire on the mysterious vessel. They checked their gunfire with radar, watching the projectiles seemingly strike the target again and again, without any effect.

They started to close in. The target stayed where it was, like a sitting duck, while they emptied their store of ammunition in a futile effort to sink it. Finally, curiosity overcame them and they cautiously crept forward, with the target still showing clearly on the screen. As they came into position where the target should be, their eyes could see nothing but a broad expanse of ocean.

The answer proved to be a mirage. Radio waves, like light waves, are subject to bending. They had been trying to sink the island of Malta. At last report, the island was still afloat.

In July, 1952, headlines proclaimed the sighting of a saucer armada flying over the nation's capital—saucers seen by eye, saucers registered by radar, saucers sighted simultaneously by eye and radar. Various airline pilots flying through the saucer areas were asked to check, and most of them drew blanks. Jet planes screamed into the regions, to find them empty. Most newspapers spoke of radar mirages as if they were a new or unlikely phenomenon. They did not know of the many difficulties that such mirages produced in World War II.

Flying saucers are real—as real as a rainbow, and no more dangerous. Men have recorded them throughout history. Although I have examined a number of reports of radar saucers, not one seems the least bit convincing. The operators fail to take into account the possibility of mirage. The sets record automatically and cannot distinguish between a real blip and a mirage blip.

How Radar Works

To understand the problem, we must know something of the way radar works. Radar is a device that sends out short, sharp pulses of radio waves. These radio pulses bounce off solid objects and give echoes that enable us to measure how far away the object is. Radar waves travel with the speed of light—186,000 miles a second. An echo returning after an interval of 1/1,000 second has traveled 186 miles, 93 miles out to the object and 93 miles back. The radar automatically measures the delay, and marks the returning signal on the surface of a "scope,"

DR. DONALD H. MENZEL, *well known to* PSM *readers for previous articles on astronomy and books on science for the layman, is Professor of Astrophysics at Harvard University and Acting Director, Harvard College Observatory. In the Navy in World War II, he worked on radar mirages.*

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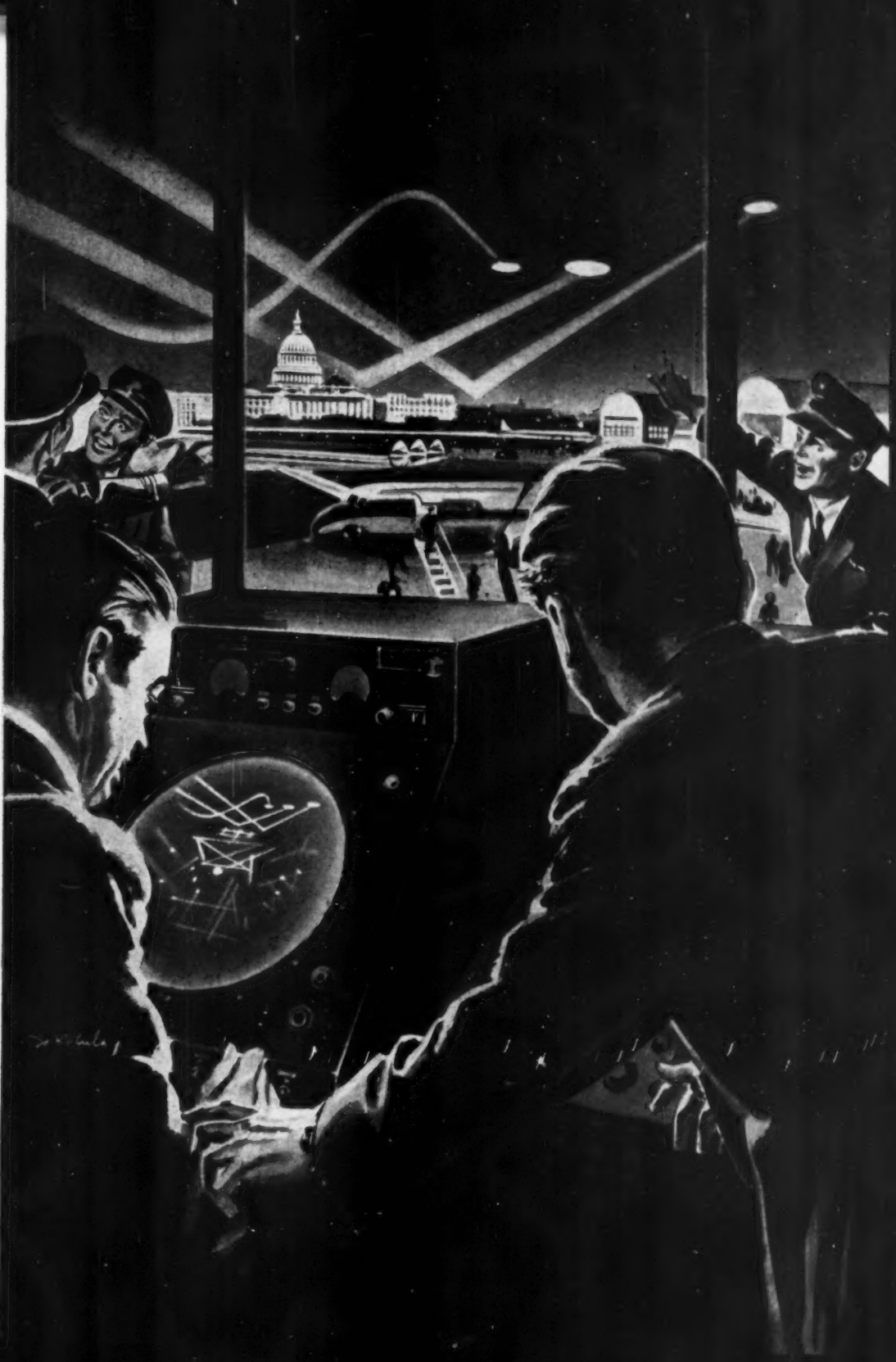


which resembles the face of a television tube.

The beam of radio waves rotates like an airport searchlight, sweeping over a circular area centered about the antenna in from two to 10 seconds. Any echo shows as a bright point—a "blip."

Sometimes the focusing action caused by a peculiar atmospheric condition introduces serious and unlooked-for complications. The radar is sending out pulses at from 500 to 1,000 times a second. It records each returning blip as if it were an echo of the pulse last sent out. But it may be the echo of some earlier pulse returning after being reflected from some very distant object.

We have seen that a pulse reflected from an object 93 miles away returns in 1/1,000 second. If we are sending out 1,000 pulses a second the echo returns just as the new pulse is leaving. But an object 186 miles away would also be returning an echo at the same moment from the next earlier pulse, and so on for other pulses.

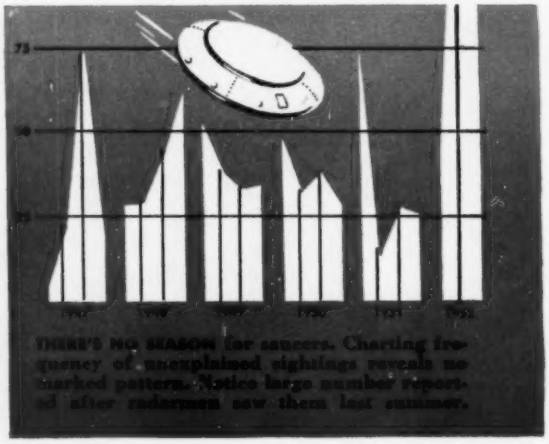
Cool Air Makes Mirages

Although the conditions that produce radio mirages are complicated, they have many factors in common with ordinary mirages. An unexpected phenomenon makes possible the reception of reflections from very distant objects.

Cool air close to the earth's surface, surmounted by a warmer layer, is ideal for production of radar mirages as well as optical mirages. One of the most spectacular and at the same time most frightening experiences came off the coast of Japan in 1944. I was a lieutenant commander in the U. S. Navy, charged with trying to resolve reports from our submarines about mysterious ghostlike images that seemed to be flitting all over the Nansei Shoto area.

The reports went something as follows: The radar operator, sitting in front of his scope, was checking on possible targets, with the submarine cruising slowly just below the surface and the radar antenna lying just above the surface. Suddenly the radar operator would become aware that one—sometimes more than one—of the bright patches of light on the radar screen was heading directly toward the submarine, on a course designed to intercept it. If he called for a change in course, the image on the screen would change course also. An officer would scan the sea through the periscope, trying to detect this mysterious vessel. And just when everyone expected the mysterious enemy craft to show up in the periscope as well as upon the radar screen, the image would vanish—like the ghost that it was. And thus came its name, the Galloping Ghost of Shoto.

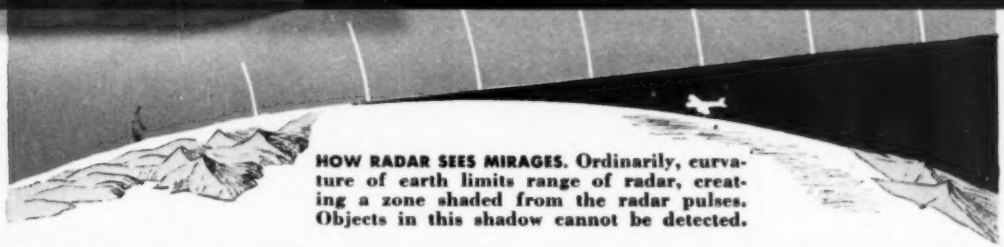
The Galloping Ghost was a mirage.



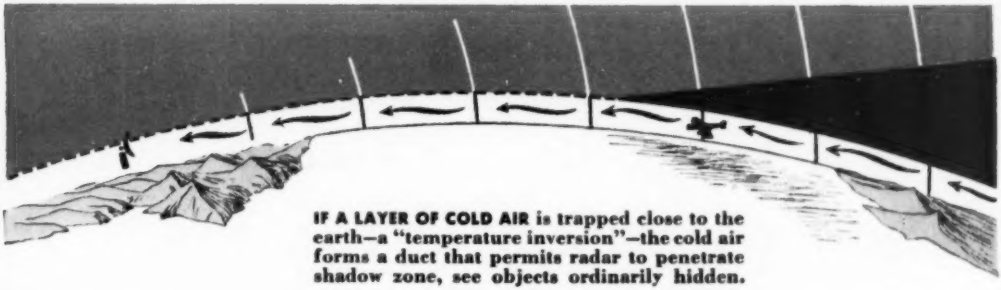
THERE'S NO SEASON for saucers. Charting frequency of unexplained sightings reveals no marked pattern. Notice large number reported after radarmen saw them last summer.

A low-lying layer of cold air, close to the surface of the sea, entraps the radar waves, keeping them from going on to higher levels. These radar pulses then bounce around from ship to shore and ship to ship, with remarkable intensity. Sometimes they are reflected more than once by the same moving object, including the submarine that sent them out originally. Thus, a beam that has suffered several reflections will seem to move at the combined speed of all the objects and hence several times faster than we should expect any surface craft to move.

Had we been expecting flying saucers, we should undoubtedly have seen them by the dozens.



HOW RADAR SEES MIRAGES. Ordinarily, curvature of earth limits range of radar, creating a zone shaded from the radar pulses. Objects in this shadow cannot be detected.



IF A LAYER OF COLD AIR is trapped close to the earth—a "temperature inversion"—the cold air forms a duct that permits radar to penetrate shadow zone, see objects ordinarily hidden.

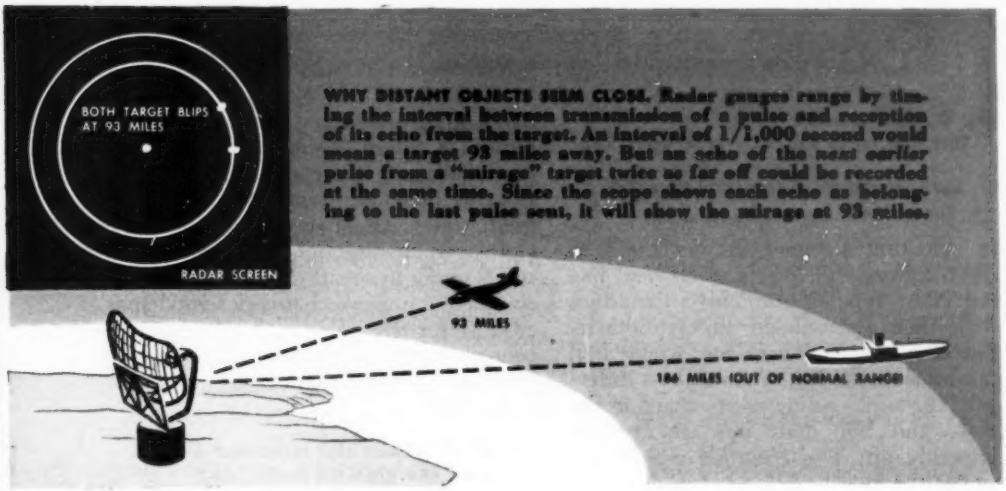
Some of the modern radarscopes record only moving objects. One of those used at the Washington Airport during July, 1952, was of this type. The blips that seemed to be an armada of saucers represented some sort of motion. But if the air layers responsible for the changes are in motion, the image of even a distant house or factory can appear to move.

Air "Sandwich" Causes "Saucers"

The meteorologic data are incomplete and the most significant information of all—namely, the temperature and moisture conditions within 100 feet of the ground—is entirely lacking. There is some evidence, however, for a temperature inversion. In addition, July and early August of 1952 were months of severe drought and prolonged heat. Maj. Gen. John A. Sanford of the Air Force Technical Intelligence Center finally confirmed the theory here presented: that a sandwich of cold and warm layers of air caused the saucers, both visual and radar sightings.

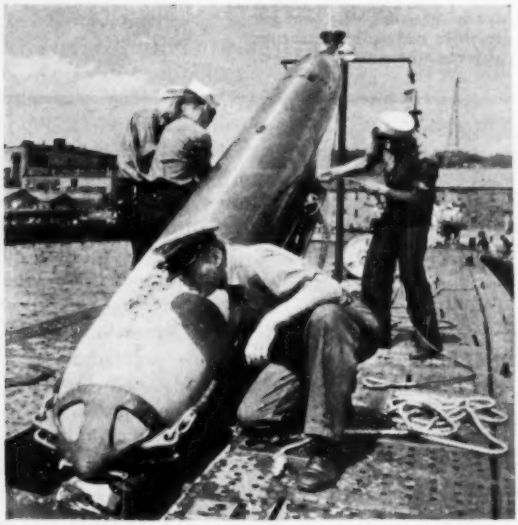
Where strong temperature inversions

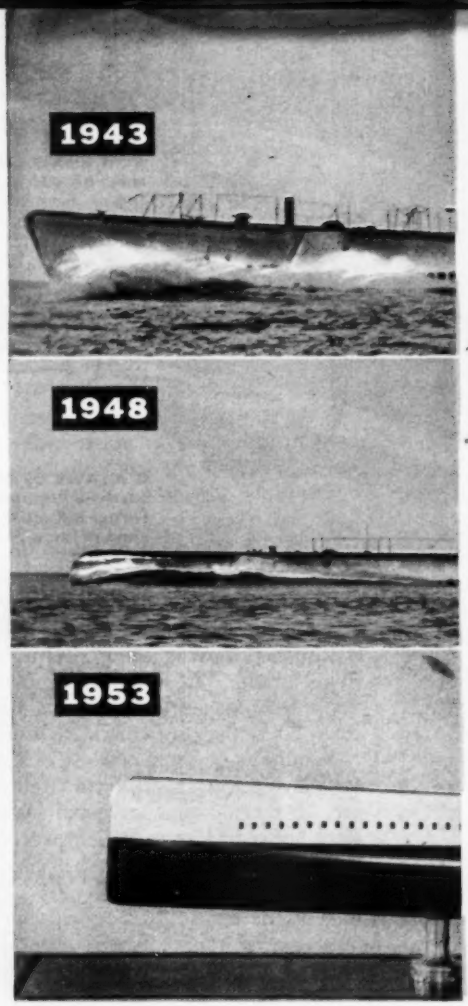
[*Continued on page 268*]



WHY DISTANT OBJECTS SEEM CLOSE. Radar gauges range by timing the interval between transmission of a pulse and reception of its echo from the target. An interval of 1/1,000 second would mean a target 93 miles away. But an echo of the *next earlier* pulse from a "mirage" target twice as far off could be recorded at the same time. Since the scope shows each echo as belonging to the last pulse sent, it will show the mirage at 93 miles.

They're Building the A-Sub Like a Torpedo





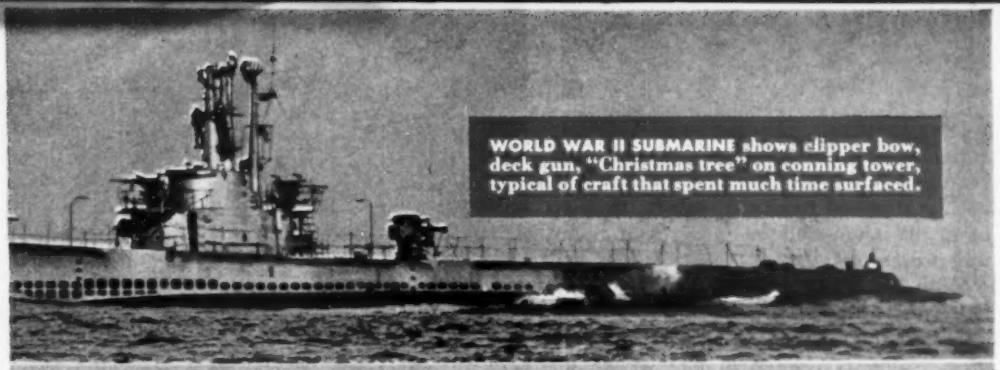
Here are answers to your questions about the revolutionary

By C. B. Palmer

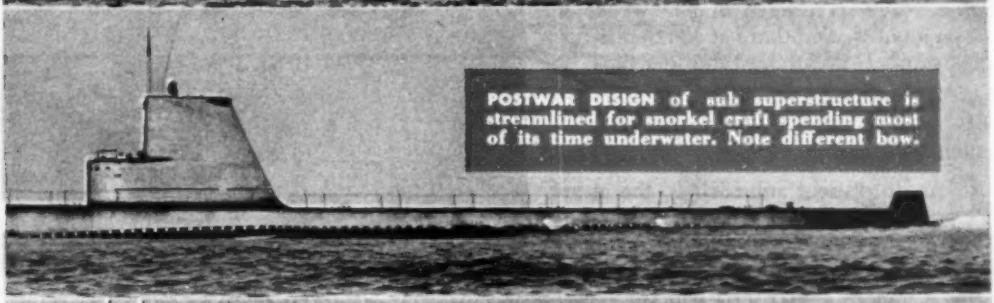
Q *What will the atomic submarine look like?*

A Floating alongside a pier the USS *Nautilus* will look a good deal like the latest type of standard submarines with their streamlined superstructures. But in drydock, where her whole hull can be seen, the *Nautilus* will look different. The usual sub is pretty sharp in the bow, and her lines flow thinly and smoothly aft. The *Nautilus* will be—as one of the men building her said—"more like a blimp or a torpedo." And with good reason. A blimp is constantly immersed in a fluid: air. A torpedo also is (in its working time) constantly immersed in a fluid: water. Aft of their noses, both are circular in cross section. Since the atomic sub is going to spend so much of its time completely immersed, it is designed specifically for that role, instead of being a compromise, as are standard submarines, between surface and underwater requirements.

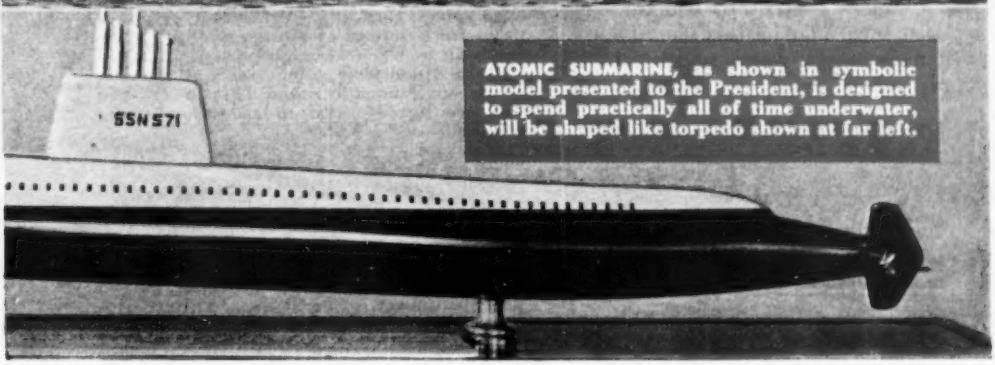
Q *What makes the atom sub better than the kind we have now?*



WORLD WAR II SUBMARINE shows clipper bow, deck gun, "Christmas tree" on conning tower, typical of craft that spent much time surfaced.



POSTWAR DESIGN of sub superstructure is streamlined for snorkel craft spending most of its time underwater. Note different bow.



ATOMIC SUBMARINE, as shown in symbolic model presented to the President, is designed to spend practically all of time underwater, will be shaped like torpedo shown at far left.

fighting ship that is now taking shape behind locked doors.

A Its fuel supply. The conventional sub requires thousands of gallons of Diesel oil and tons of storage batteries, plus engines for surface running and electric motors for undersea cruising. The atomic submarines will, according to official statement, carry "a few pounds" of uranium (U-235). This uranium will power both surface and undersea operations. When a ship needs to carry only a "few pounds" of fuel, it gains mightily in space and load capacity. Actually, the gain isn't quite as good as it sounds, for a nuclear power plant needs heavy shielding to keep its radiation locked up.

Q ***How fast will the atom sub go?***

A Ex-President Truman said at the keel-laying ceremonies that the atom sub would do better than 20 knots—underwater! (In contrast, our fastest present subs—the *Tang* class—are rated by *Jane's Fighting Ships* at 15-plus knots underwater and about 20 on the surface.)

Q ***What will be the atom sub's range?***

A Since the atom sub presumably will be powered almost indefinitely with

a small amount of uranium, its total range will depend only on how much food can be packed into the hull (water can be distilled from sea water). In any case, its range will be far greater than any present sub.

With no need to surface to recharge batteries, as present subs must, it will cruise in the depths for long periods of time. Navy spokesmen hint at weeks or even months. And that's at full depth, not just snorkel—breathing-tube—depth.

Q ***But how about air? How will the crew be able to stay down for such long periods?***

A As do present submarines, the atom sub will carry oxygen under pressure. There is also an "air-scrubbing" machine that removes carbon dioxide from air so that it can be rebreathed and the Navy is said to have a device that manufactures oxygen from sea water so that the air supply can be constantly replenished.

Q ***How deep will the atom sub be able to dive?***

A Deeper than any submarine ever did before.

Q ***Is an atom sub less vulnerable to enemy attack?***

A Yes, mainly because it can hide better. It will be able to operate for days without surfacing or even coming to snorkel depths, it will leave no wake or air bubbles, froth, or wave-pattern disturbance (which lasts a long time). The atom sub can also operate at such depths in open ocean that aerial observation cannot spot it or its shadow. Because it can either swim or hover at greater depths it can put more layers of water between it and an enemy surface vessel. Since the layers are likely to be of various temperatures and moving in various directions, this makes it harder for detection gear to discover the sub.

Q ***Will atomic fission drive the sub directly?***

A No. The *Nautilus* will harness a by-product of atomic fission: heat, generated by the friction of colliding atomic particles.

"CRYSTAL BALL" is plastic model of 225-foot steel sphere that will house prototype power plant for a second atom sub. Shell, now being built by GE near Schenectady, N. Y., will contain a complete submarine hull section, partly surrounded by water. This power plant will use liquid metal to carry heat from reactor to steam boilers.

Q ***How will this heat be put to work in the atom sub?***

A The *Nautilus* will use a heat exchanger similar in principle to the device that provides hot water in many house heaters. Inside the reactor there are water passages. But instead of a fresh supply of water constantly flushing through an open circuit, as in a pile on shore, there is a closed circuit, with the same water being pumped around and around. Part of this cooling circuit is outside the reactor, in close contact with an entirely separate water supply. This outside water picks up the heat from the reactor-cooling water and is vaporized. This steam runs the sub's turbines.

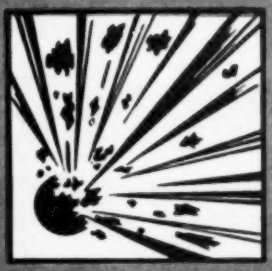
Q ***Doesn't the radiation from hot atoms make it difficult to use them inside a sub?***

A It certainly does. Take that closed water circuit that moves the heat

[Continued on page 260]

These Pictures Spell "Danger" in Any Language

LANGUAGE barriers can be shoved aside by a new set of labels that make danger read the same in every language. These picture warnings were proposed by the International Labor Organization at a Geneva conference. They would be used to identify dangerous goods moving across borders.



EXPLOSIVE

INFLAMMABLE

RADIOACTIVE

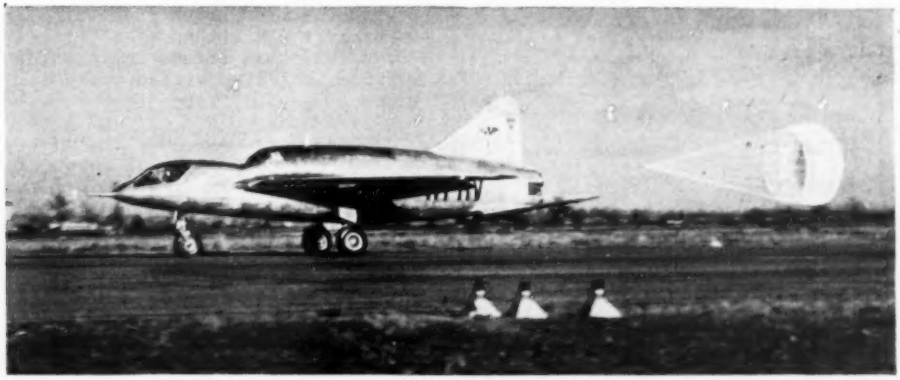
CORROSIVE

POISONOUS

New French Jet Fighter Looks Like a Flying Turtle

THE latest of the French jet fighters—the Grognard—is shown below coming in for a landing, its parachute streaming out behind to brake its speed. The profile shot points up its odd hump-backed appearance, which results from the engine arrangement—two Hiso Nene jets mounted one above the other in the fuselage with intakes just behind the cockpit. The plane weighs 31,900 pounds, measures more than 55 feet in length and has a swept-back wing with a span exceeding 51 feet.

Figures on speed have not been disclosed but the fighter can range 645 miles on all-weather duty. It can scramble to high altitudes at a rate of 5,314 feet a minute.



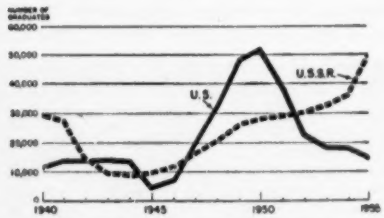
P.S.

Last minute news & notes...

LAST OF THE BIG THREE to adopt no-shift driving, Plymouth last month announced an optional torque-converter transmission for its '53 models. Costing less than the Ford and Chevrolet automatic drives, it is backed up by a standard three-speed gearbox for emergencies.

FOOTNOTE ON EVOLUTION in fighter planes: A new Navy model outweighs a standard twin-engine commercial airliner complete with two pilots, a hostess, 21 passengers, their luggage and the usual mail load.

EYES OF HORSESHOE CRABS may speed development of a new kind of compass for flights over the Pole, where magnetic compasses are useless and twilight hinders celestial navigation. These crabs, like bees, navigate by using their eyes' ability to detect polarized light, such as sunlight reflected from the sky. By studying the crabs' eyes (they are larger than bees'), Yale zoologist T. H. Waterman hopes to learn and apply the secret.



RUSSIA IS OUTSTRIPPING US in training engineers, warns this National Science Foundation graph, showing the number graduating yearly. By 1955 our own figure will slump to about 15,000; for the same year, the Soviet goal is nearly 50,000.

CLOTHESLINES DON'T SAG when a non-stretching core of glass fiber is built into them. A cotton-covered line of the new type is marketed under the trade name Super Planet.

LIKE BLOOD IN A MAN'S VEINS, cooling liquid will course through hollow copper wires forming the stator windings of a new GE electric generator that will produce 208,000 kilowatts, enough for the household needs of 600,000 people, in a Cleveland power station.

"PUFFED" ORANGE-JUICE POWDER, made by drying liquid concentrate in hot vacuum chambers, is being tested by the Army Quartermaster Corps. The product is said to retain natural flavor and combine readily with water again.

NUCLEAR REACTORS will be operating in 15 countries within the next decade, predicts "Nucleonics," atomic-energy journal, after a survey of research programs in North and South America, Europe, Asia and Australia.

A NEW LIGHTWEIGHT OCEAN CABLE, only a fraction as heavy as the standard steel-jacketed kind, will aid in linking the continents. Made of cadmium bronze wire with polyethylene plastic insulation, it requires no armor. A 20-mile length has already been spliced by Western Union into the New York-Nova Scotia cable off Long Island.

RADIOACTIVE WRISTBANDS now safeguard punch-press workers. A Geiger counter won't let the machine work if radioactivity shows a worker's hands in the danger area. An operator cannot trick the control by removing the wristbands--a timer locks the press unless radioactivity has been detected within the previous 15 seconds (when the stock was inserted).

FLYING PHOTO STUDIOS will help fight fires in the Australian bush. Lincoln bombers are being adapted to photograph a fire from the air, develop the picture while still in flight and drop a print to fire spotters on the ground.

The Editors

How to Build Your Own Screens

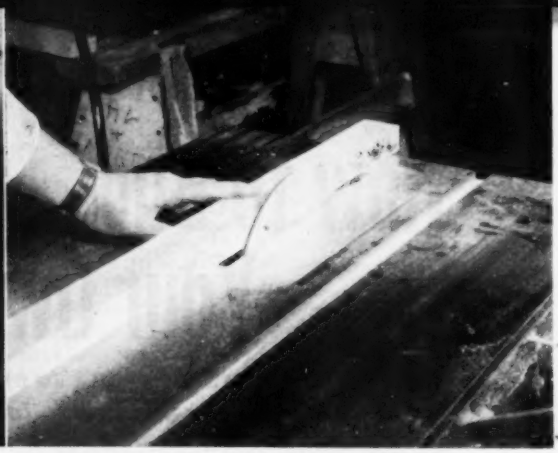
Custom-built screens aren't so expensive—when you're both the customer and the builder. Here's step-by-step guidance.

IF YOU'RE in a new house with odd-size windows a complete set of screens can put quite a dent in your pocketbook. Building them yourself, you can have them at a fraction of the retail price.

If you've got screens to repair, you'll find it almost as cheap and easy to build new ones as to repair the old set.

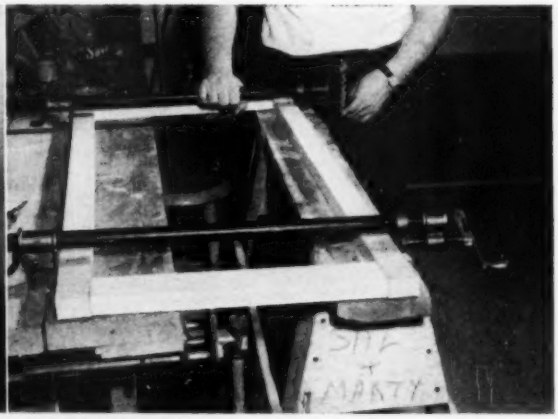
Measuring windows. To start with, measure the width and height of your ex-

1 TWO VERTICAL PIECES should be clamped together and run through saw at same time to make sure they are of identical length. Use a miter box if you have no power saw.



2 SAND ALL PIECES SMOOTH. Sanding disk of type that mounts on saw arbor will give pieces a satiny finish, as will a conventional belt and disk sander. Use fairly fine paper.

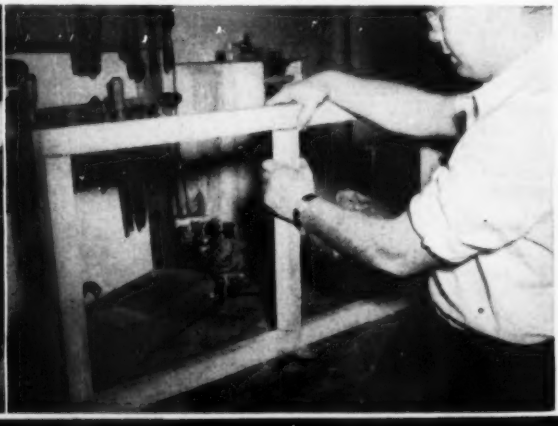
4 TAPER END OF DOWEL by holding it against sanding disk and spinning it lightly in your hand. All dowels should be cut and prepared before you start to assemble frames.



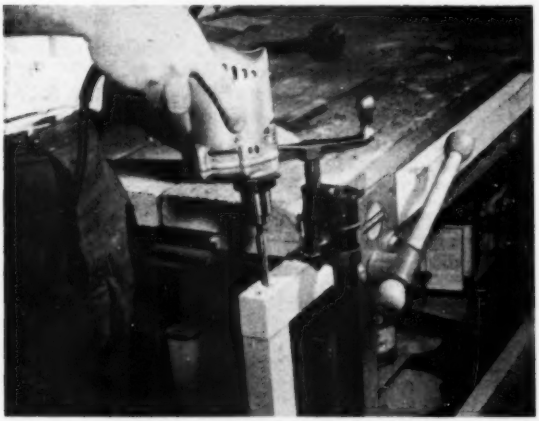
5 ASSEMBLY. It's easier to glue the frame together and then put in the dowels. A pair of long clamps, such as the adjustable pipe jobs shown above, will speed this operation.

7 DRIVE DOWELS after coating each with glue. Wipe off excess that oozes out. Clamps could come off now, but it's preferable to let the glue have a chance to set first.

8 MIDDLE CROSSPIECE is now fitted in the center of the frame and glued. Only one dowel is needed at each end. Your frame is ready to be planed to fit the window opening.



3 PLANE A FLAT along one side of dowel, held in vise, to provide escape slot for glue. One or two light strokes does it. Ten 3/8″ dowels, each 4″ long, are needed for each screen.

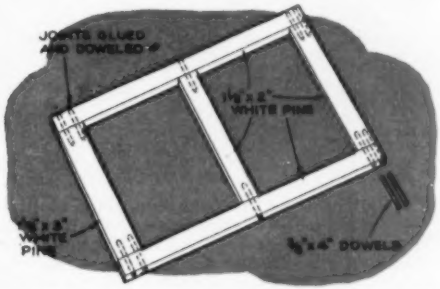


6 NOW DRILL two 3/8″ dowel holes a little more than 4″ deep in each corner joint. Be careful to get holes true—a jig made by boring one hole in a small block will help.

9 PAINT ALL YOUR FRAMES before covering them. Give the frames a coat of exterior primer first. Allow this to dry for two or three days, then apply a coat of trim paint.

terior window frames carefully. Plan your screen frame to be about ¼″ bigger in both directions so that you can plane it to an exact fit.

Good stock to use is select-grade white pine 1¼″ thick. Be sure there are no warped pieces. The two vertical side members, the horizontal top member and the horizontal



middle piece are all 2″ wide. The horizontal bottom rail is 3″ wide. These are the dimensions by which you will buy your lumber, but the actual finished dimensions will be more like 1¾″ for the narrow pieces and 2¾″ for the bottom rail.

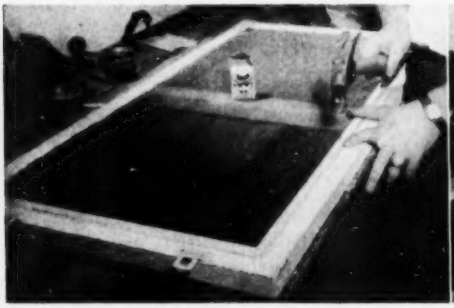
Corner joints. By far the best corner joint for assembling the screen frames is the doweled and glued one shown in the accompanying photographs. Use a waterproof glue intended for outdoor work.

Two alternative methods, however, involve less work and are adequate for small screens, such as are needed on basement windows. A mitered corner joint can be glued and fastened with corrugated fasteners that will hold the two pieces together under pressure while the glue dries.

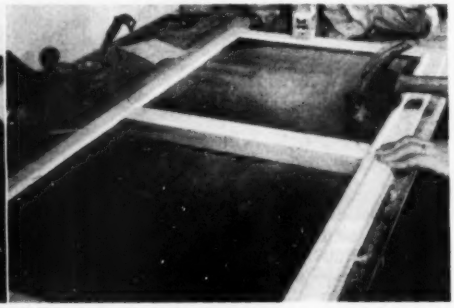
A nailed butt joint reinforced with a metal bracket is another method for small screens. Smear the end of one piece with glue, then hold it upright in your vise while you nail the other piece onto the end with two long finishing nails. Then screw a metal angle bracket on each corner, using 1″ flathead screws.

Painting frames. Whatever joining method you use, you'll save yourself a lot of work if you fit and paint the frames before covering them with wire. Plane them to a snug but not a tight fit. Don't forget to bevel the lower edge of the bottom rail to match the slope of your window sill. Then, with numbering tacks, number frames and windows in pairs so that you can tell where each screen goes. Fasten your screen hangers in place at the top. Then from the in-

10 STRETCH SCREEN WIRE into place by placing two screens end to end with outer ends blocked up 3", forming shallow V, as shown above. Fasten screen wire at one end, then pull it across and fasten it to far end of other screen. Now remove the blocks and let the frames fall back onto the floor, as at right, putting the screen under tension. Complete the tacking around the other three sides, lapping wire onto wood about ½" all around. Then cut screens apart and trim off waste wire.



11 COVER EXPOSED EDGES of wire with ½" half-round molding. Paint molding first and then nail in place with 1" brads. It's not much more work to miter the corners.



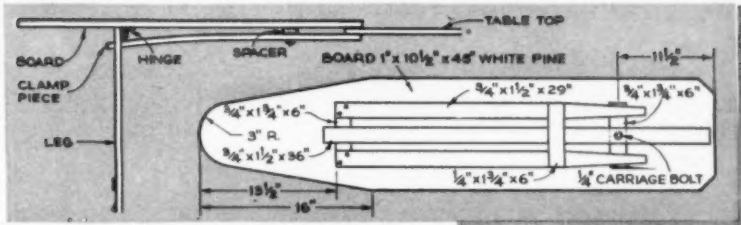
12 NAIL A BATTEN STRIP, ¼" by 1¾", instead of half-round molding across the center rail. This covers up wire over the center crosspiece for a neat job.

side, screw in hooks and eyes to hold the bottom rail of the screen to the window sill.

Fastening screening. For the screening, by all means use either aluminum wire or one of the many new plastic wires now available. These types are much easier to stretch into place, and you need never worry about corrosion causing unsightly stains on the adjoining woodwork. While this screening can be fastened in place with regular carpet tacks, it is much faster and easier to do the job with a stapling gun. If you do not own one you can probably rent one from a local building-supply dealer.

As a final step, countersink all nail heads slightly and fill the remaining holes with putty. After the entire screen is done, these little spots and any other marks in the paint can be easily touched up with the same paint.—*Bernard Gladstone, N. Rockville Centre, N. Y.*

Next Month: The lowdown on how to take a glamour shot of your car, told by Grancel Fitz, veteran auto-ad photographer.



Ironing Board Clamps to Table

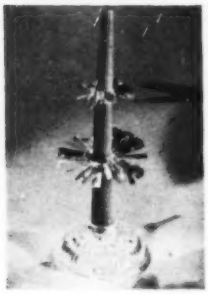
HERE'S just the ironing board you need if you live in a trailer or small apartment. It is light, compact and easy to make. Unfolding the leg clamps the board securely to the edge of any convenient table.

Make the board from a 48" length of top grade 1" by 12" white pine, planing or ripping it to a 10½" width. Taper one end to the dimensions shown. A piece of ¾" plywood will serve if you have trouble locating wide stock. Glue the two crosspieces to the legs, allow them to dry overnight, and reinforce the top one by driving two 1¼" No. 8 wood screws into each leg. Attach the leg assembly to the board with two small butt hinges. Fasten the clamp strip and spacer block to the board with a ¼" carriage bolt. *—John Rogers, Dallas.*

Red Staples Warn to Refill

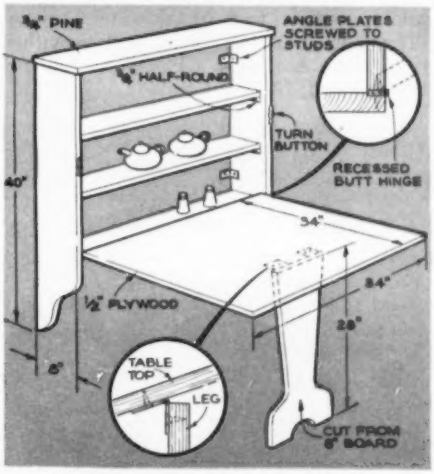
COLOR the tops of the last 10 staples red and they will let you know when your stapler is about empty. Then you won't, for instance, climb to the top of a ladder with an almost empty stapler. Fingernail polish works fine.*—Ken Murray, Colon, Mich.*

Aluminum Foil Trims Candles

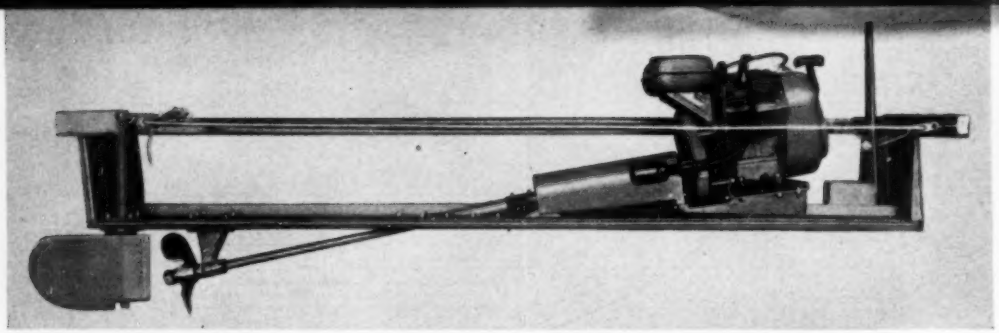


DECORATIVE candles can be made more attractive by trimming them with disks of aluminum foil. Cut holes in the disks and push them over the candles. Then snip the rims of the disks into narrow segments. Colored foil can also be used.

Table Folds Against Wall



THERE'LL be more space in a tiny kitchen if you build a folding snack table like this. It also provides three enclosed shelves for dishes and spices. Be sure that the mounting screws enter the wall studs. A folding cabinet brace, though not essential, will stiffen the leg.*—Hi Sibley, Nuevo, Calif.*



Lawn-Mower Engine Used in $100 Inboard Kit for Rowboats

USING hand tools alone, you can convert almost any small boat to power with this kit, and wrap up the whole job in four to six hours. It includes a 1¾-hp. engine, transmission, coupling, shaft, housing, propeller, rudder and steering lines. A full-size template simplifies drilling the four bolt holes for mounting the engine.

A four-cycle air-cooled engine, similar to that used in Reo lawn mowers, is fitted with an ingenious reverse gear that also has a neutral position. The engine has built-in speed reduction—the camshaft is in effect the output shaft.

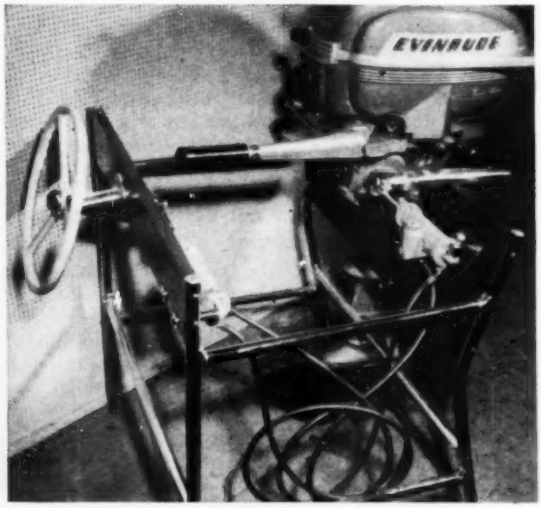
Boats with heavy keels are no problem; you just offset the power plant slightly so the shaft misses the keel. Moreover, the rudder can be located so that it doesn't interfere with an outboard—in case a fisherman wants to use a husky outboard to get to where they're biting and the inboard for quiet trolling. The 56-lb. Trollabout kit, made by Reo Motors, sells for around $100 for fresh water, $120 for salt.

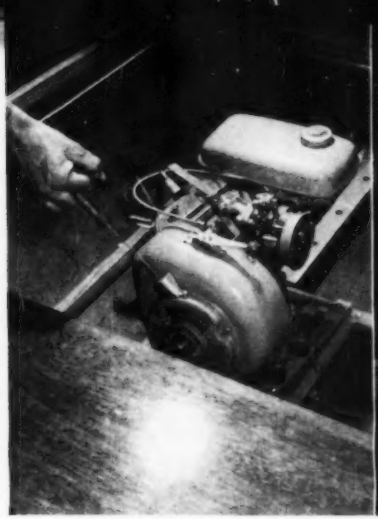
Outboard Controlled Like Auto

STEERING wheel, gearshift lever and throttle control are combined in this remote-control unit for outboard-motor boats. The exposed fittings of the cables from wheel to motor are brass to resist salt-water corrosion. The control unit is available with or without a wheel. *Ace Boat Co., Brewerton Rd., Syracuse 11, N. Y.*

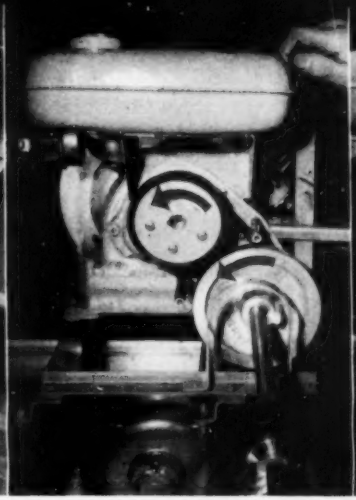
Hydraulic Control for Outboard

NINE screws are all that are needed to install this hydraulic steering control on an outboard boat. The steering wheel operates a rack and pinion gear which activates the master cylinder. Lines from the master cylinder carry fluid to a cylinder on the transom which moves the motor left or right. *Fox River Sales, Oshkosh, Wis.*

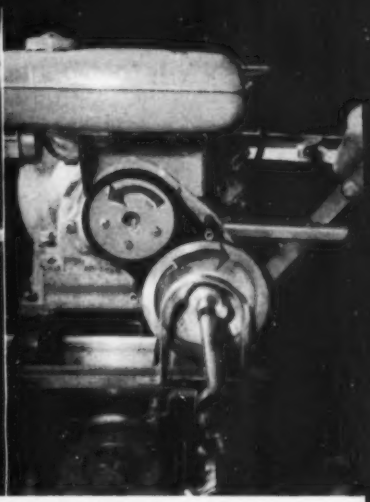




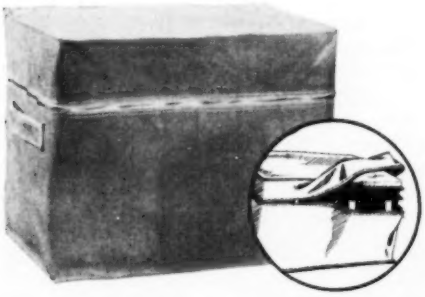
STARTER is the automatic-rewind type. The single-cylinder, four-cycle, 1¾-hp. engine will push a boat as fast as 7 m.p.h., depending on the size of the hull. Piston and connecting rod assemblies are automotive type of cast aluminum alloy.



FORWARD SPEED is through a V-belt drive, with engine and shaft pulleys both turning in same direction as indicated by arrows. Clutch adjustment is made by loosening one nut and bolt. The air-cooled L-head engine has a 1¾″ stroke and a 2″ bore.



REVERSE SPEED is through a friction drive with pulley wheels on engine output shaft and propeller shaft engaged. V belt is disengaged. In neutral, both pulley wheels and V belt are disengaged. The propeller shaft and coupling are normally covered.



Covered Life Jackets Make Seat

Four life preservers can be converted to a seat and also protected from the weather by this zippered, water-resistant canvas cover. The 13½″ by 18″ by 24″ cover can be bought separately or with four life jackets. *R. H. Philbrick, 220 Miracle Mile, Coral Gables, Fla.*

Glass Skin Seals Boat Hulls

A recently introduced coating of resin and Fiberglas cloth can be applied to any part of a wooden boat to eliminate leaks. The cloth won't rot, stretch, shrink, mildew or burn. Kits are available for different-size hulls. *U-Mak-It Products, 701 Whittier St., NYC 59.*

Auxiliary Tank Holds 20 Gallons

Designed to fit under the cockpit seats of an outboard cabin cruiser, the extra tank at right increases the boat's range by about four times. The dimensions are 8¾″ by 16″ by 35″. Pumping units supplied by Evinrude and Johnson motors will work with it. *U-Mak-It Products, 701 Whittier St., NYC.*

How Twisters Are Born

Tornadoes kill several hundred persons yearly. A series of stunts will show you what sets off these deadly storms.

By Kenneth M. Swezey

SOME sultry afternoon this spring a towering mass of dark greenish cumulus cloud will start building up in the lower Mississippi valley. The air is still, almost oppressively so.

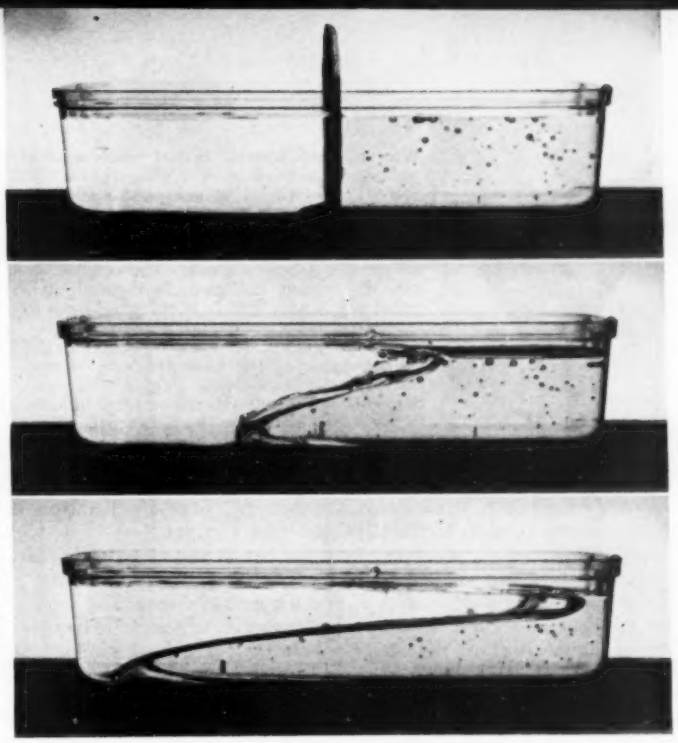
Mothers in nearby towns glance apprehensively at the sky and warn their children not to wander. Suddenly a black funnel of cloud drops down from the cumulus, curling like the tail of some monstrous sky-borne cat. To the northeast, the people of a little town run for their storm cellars.

The cat tail thickens and stiffens into a great column from sky to earth—and roars across the countryside at 40 miles an hour, jumping and skipping like a drunken giant. As it sweeps into town trees topple, fences blow away. Wherever the heart of the cloud funnel touches, buildings explode, walls and roofs blow outward as if by dynamite. As they collapse, flying fragments are whirled upward and carried off along with trees, cars, people.

In half a minute the storm has gone as suddenly as it came, roaring away to the northeast. But when the survivors stick their heads out of their shelters they find a quarter-mile swath cut through town. People who didn't make a shelter lie among the ruins.

That's what happens when a town is hit by a tornado—the most violent windstorm on the face of the earth. In an average year, 100 twisters whip across the United States, most of them in spring or summer. They cause an annual property loss of nearly $15,000,000. They kill several hundred people a year.

Fortunately tornadoes are comparatively short-lived. But because they start unexpectedly and exhaust their fury rapidly scientists still do not know precisely what causes one. The general sequence that starts a tornado on its rampage, however,

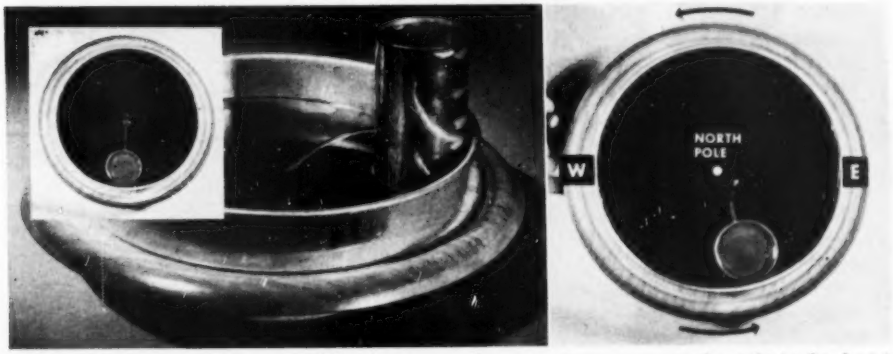


Cold air raises hot—and the greater the temperature difference the faster this takes place. To see how it works, divide a flat-bottom glass dish in half with a cardboard partition. Pour in corn syrup on the right side to represent dense, cold air; water on the left as light, warm air. Lift the partition and the syrup (cold air) will flow under the water (warm air), raising it. When the syrup has moved completely under the water all movement stops. In the same way, when a cold air mass has completely lifted a warm air mass, a tornado loses its destructive energy.

is probably something like the following:

A big wind **is the start of any tornado.** All winds are simply air moving fast from an area of high atmospheric pressure to one of low pressure. These pressure differences are caused by unequal heating of the earth's surface. When air is warmed it expands, becomes lighter, and is buoyed up by cool, heavy air moving in under it.

When a column of hot air—from heated ground or perhaps from the Gulf of Mexico—meets a mass of cold air a tornado can be born. The cold air, often moving south from Canada, slides in under the hot air, pushing



Why a wind curves. Set a can full of water, with a tiny hole in its side, in a pie pan on a Lazy Susan. When the Susan is not moving, the water squirts out in a straight line (inset left above). This represents the path a wind would follow if the earth did not rotate. But now spin the Lazy Susan counterclockwise, representing the eastward rotation of the earth as seen from above the North Pole. This time the Coriolis force makes the water stream curve to the right (right above). This is because the point on the pan at which the stream starts is traveling faster than the point nearer the center at which the stream touches the pan. The stream therefore gets ahead of the slower-moving part of the pan. Head the stream away from the center and it still bends right, but because the stream is moving slower than the outer part of the pan it falls behind.

Why a wind whirls. Squirt water against right-hand inner face of a glass funnel and you will see why a tornado whirls counterclockwise. The sides of the glass represent the restraining pull of the low-pressure center that diverts the wind, represented by the water stream, from its course. The only direction the stream can go is to the left, in a counterclockwise spiral. If the wind went to the left of center it would whirl clockwise—but in the United States it always goes to the right because of the Coriolis force. Named for a Nineteenth Century French mathematician, this force diverts all moving objects, to the right in the northern hemisphere, to the left in the southern hemisphere.

it up still faster. At the same time there is rapid movement—a wind—from the heavy, high-pressure cold air to the light, low-pressure hot air.

Now as the air moves from the high-toward the low-pressure area it doesn't go straight but in a curve to the right (facing the direction toward which the wind is blowing). This results from the Coriolis force. Caused by the earth's rotation eastward, it pulls any moving object in the northern hemisphere off course toward the right.

The twister. As the spinning water goes down the narrowing sides of the funnel (representing the increasing push inward as a wind moves nearer a low-pressure center) its rotation becomes faster and faster because the circular distance it must travel is less and less. Finally it forms a rapidly revolving vortex of water with a hollow center, very much resembling a tornado in air. This hollow center is a big reason why a tornado is so destructive.

As a result of this bend to the right almost all tornadoes twist in a counterclockwise direction. The wind, being off course, starts to pass by the center on the right-hand side. By the time the wind is abreast of the center, however, the push into the low-pressure area is so great that it overcomes the Coriolis force and diverts the wind in the opposite direction, to the left. The push isn't great enough to force the wind immediately to the center, however, but twists it more and more to the left in a curving spiral—counterclockwise.

This whirling spiral, which grows by itself, is the heart of a tornado. As the spiral grows tighter, the wind blows faster, up to 300 miles an hour. And the faster the air whirls in toward the center, the faster the spiral pushes hot air up toward the upper atmosphere until the updraft reaches 100 to 200 miles at hour. This drops the center pressure still more, and more air is pulled in.

The cloud funnel is a cloud of water droplets whirling around this low-pressure center. When it touches a building on the ground the structure is blown apart by the high-pressure air trapped inside. And the upward motion of the air inside the funnel carries debris long distances.

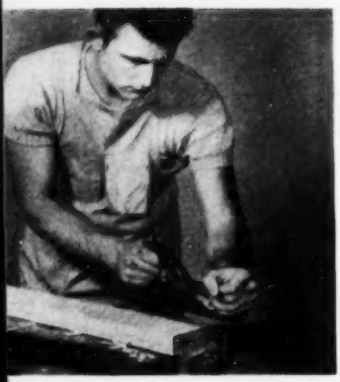
Tornadoes can occur at sea too, where they are known as waterspouts. They are more short-lived than on land, but mariners keep well away from them.

You can see for yourself what makes a tornado tick by some simple experiments right at home. Hold a lighted cigarette below a hot table lamp and the smoke will show how rapidly heated air rises. Blow smoke across a can filled with cracked ice and you will see the falling current of cold air carry it downward.

Why houses explode in the heart of a tornado. Put a corked vial inside a gallon jug. Pump the air out of the jug (an aspirator that works by water from a kitchen faucet will do this). As air is exhausted from the jug, the pressure difference between the air in the vial and that surrounding it becomes greater and greater. Finally it overcomes the friction holding the cork in and pops it out (right above). In the same way high-pressure air trapped inside a house blows it apart when the tornado center suddenly drops the pressure of the air outside. END

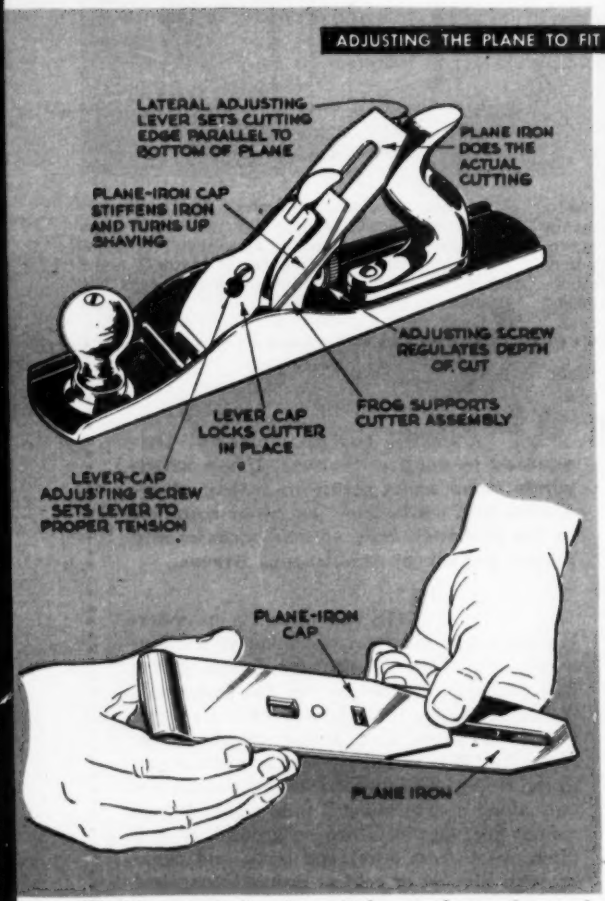
Watch Out... in APRIL for tornadoes. Unequaled in destructiveness, these whirlwinds occur most often on spring afternoons. And while they are most common in the Midwest, they appear occasionally in every part of the United States.

THE best refuge is an underground storm cellar. A basement of a frame house is a refuge because the house, if hit, will probably be blown off the basement. A basement of a brick house is *not* a refuge, for the bricks are likely to fall straight down. No cellar? Run or ride by car at right angles to the storm. The tornado will be destructive only along a strip about ¼ mile wide. **If you cannot flee, lie face down on ground, or in a ditch, away from wires and trees, and cover up with blanket or coat as protection against flying debris.**

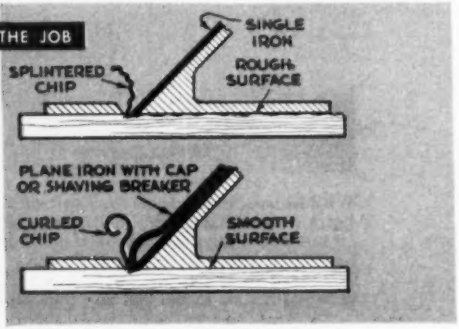


Plain Talk About Hand Planes

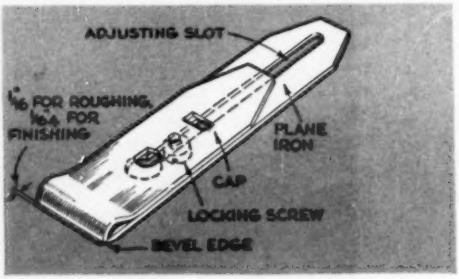
By Edwin M. Love



Working parts of a plane. Before you know what to adjust, you must know the function of the various parts. The plane-iron cap (directly above) fits over the plane iron to stiffen it and curl up the chip. Without it the chip would be ragged and uneven in thickness.



Single iron vs. double iron. Early planes were not equipped with the plane-iron cap. Top sketch shows how single-iron version produces splintered shaving. Modern double-iron model (lower drawing) curls the shaving and prevents it from gaining enough length and leverage to cause splits and undercuts.



Adjusting the cap iron. For best results generally, and always on cross-grained wood, the cap iron should be adjusted to the depth of cut. For roughing it should be about 1/16" from the cutting edge; for finishing, 1/64" or less. Locking screw is loosened slightly for cap adjustment, then tightened without changing setting.

Half the secret is knowing your plane; the other half, knowing how to use it. These tips will smooth your way to smoother surfaces.

ONCE upon a time some ancient and crafty craftsman stuck his chisel through a block of wood and drove a wedge in with it to hold it there. On that obscure day the plane was invented. It has since been improved upon and modernized, but the principle is still the same.

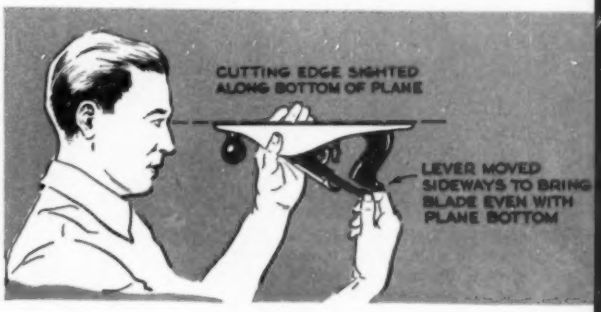
In spite of the development of such power tools as the jointer, the plane still has its place in every woodworking shop. The surface of any board wider than 6" (the capacity of home-workshop jointers) must be smoothed by hand even though it has been dressed at the lumberyard. It is often warped, pitted by the planing machines or scratched from storing and handling.

The basic idea in smoothing any board is to take off the high spots and gradually even off the surface until it is perfectly flat. Sounds easy, but unless you know the tricks you can tear the board to pieces or shave it down until it is too thin to use. Half the secret is in properly adjusting the plane, the other half is knowing how to use it.

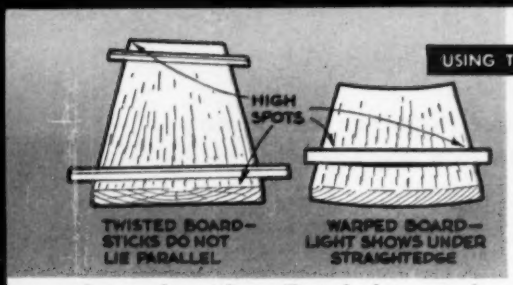
The frog. This is the least adjusted part of the cutter assembly. Its purpose is to support the blade, and it is set to provide a minimum space between the blade and the blade opening in the bottom of the plane. To move it, loosen base screws.

Lever cap. After the plane iron and cap iron are placed on the frog, the lever cap is slid under the lever-cap screw and the cam pressed down. If the cam will not snap in place under firm pressure of the heel of the hand, loosen the screw slightly.

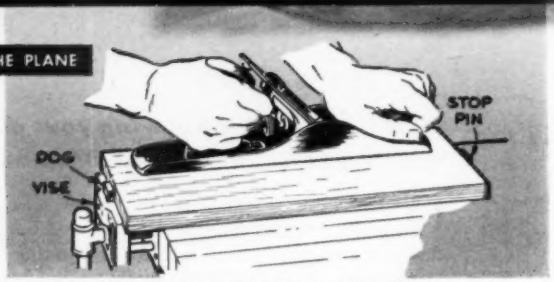
Lateral adjusting lever. The cutting edge of the blade should be ground as nearly square with the sides as possible. To compensate for out-of-square grinding and set the blade true, the lateral adjusting lever tilts the blade to either side. Sight edge as in sketch at right.



Please turn the page for more about hand planes.

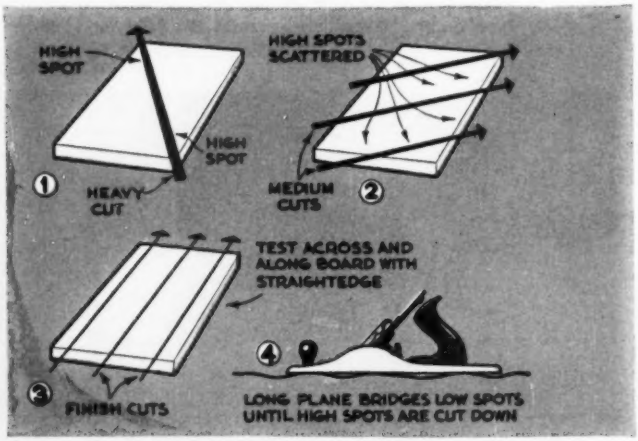


Survey the surface. First check to see where most planing should be done. Two sticks laid across the board ends will indicate "wind" or twist; a straightedge will show up any curvature in the board caused by warping. Mark the high spots.



Secure the board. Bench stops will hold the board against forward pressure while planing, but it may tend to swivel at the start of the stroke. A woodworker's vise has a retractable dog that presses the work against the bench stop, holding it securely but leaving the top clear.

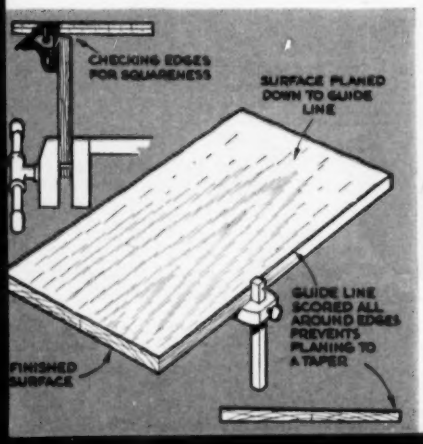
Rough cuts first. Plane is set for heavy cut and high spots taken off. Test for flatness by tilting plane on one corner and looking for light streaks underneath it. When board is worked down, plane is set for light cut and the whole surface worked over until it is smooth as well as flat.

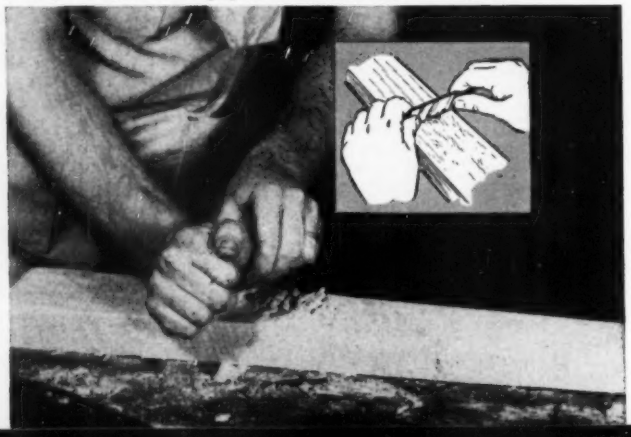


Steps in producing a flat surface. Take heavy cut from high spot to high spot diagonally across board. Reduce depth of cut and work on opposite diagonal until plane begins lopping off little high spots. Reduce cut to minimum and plane along board to pick off remaining high points. Check with straightedge both across and along board. Long plane is best for surfacing as it will bridge the low areas.

Finishing opposite side. After finishing one surface, the other side should be smoothed in the same manner. To bring board to uniform thickness, edge should be scored with a marking gauge and surface planed to this line. Edges are then planed square. Lift plane at end of each stroke.

Final smoothing. For the final going over after all surfaces are flat and smooth, a square-edged scraper is the tool to use. Scrapers are not sharpened, but are filed square and a burr turned on one edge with a blunt tool or steel rod. The scraper is held almost vertical and either pushed (photo) or pulled (inset sketch) along the work. Sand lightly with No. 6/0 sandpaper after scraping. For finicky work, use worn paper and sand with grain only. END





How You Can Use Modeling Clay

KEEPING small fingers out of mischief is not all that modeling clay can do. Scrounge a bit from the kids. You'll find it handy.

A clay seal will identify poison bottles even in the dark. The photographer can make small clay weights for measuring chemicals, and prop objects at desirable shooting angles with dabs of clay. Clay can be molded around bottles to prevent tipping.

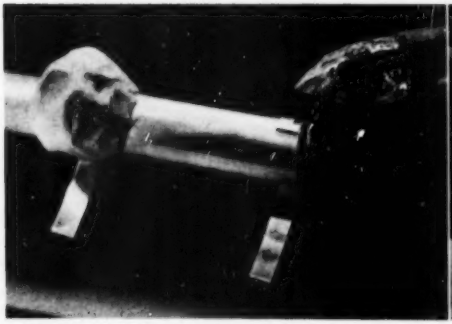
The craftsman will find that clay makes a form-fitting backing for sandpaper used to smooth curved shapes. It will hold screws on screwdrivers or nuts behind holes.

Nonhardening clay is dry clay mixed with petroleum jelly or a similar binder. If it is too dry, work in more jelly. For more tackiness, knead in a little powdered resin.

Kids shouldn't have a corner on this stuff. Here are dodges to help around the house.

CLOSE GLUE CANS, test tubes, flasks or acid bottles with a lump of clay to keep contents airtight. Clay will also hold repairs together while cement dries, as at right above.

FORM CLAY DAM as above to keep turpentine and abrasive around the brass tube or file used to drill glass. At left above, a clay dam retains coolant for drilling metal.

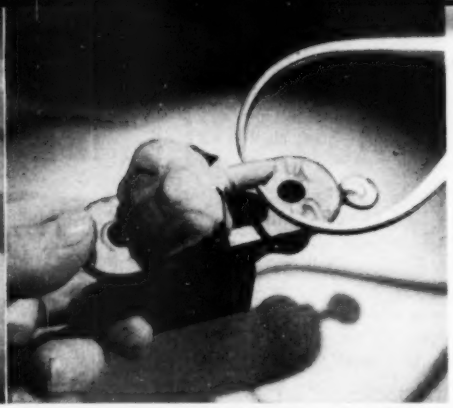


PACK CLAY around soldered joint to keep it from opening while second one is heated. In jewelry work, clay will protect gems from soldering heat. Solvent will remove residue.

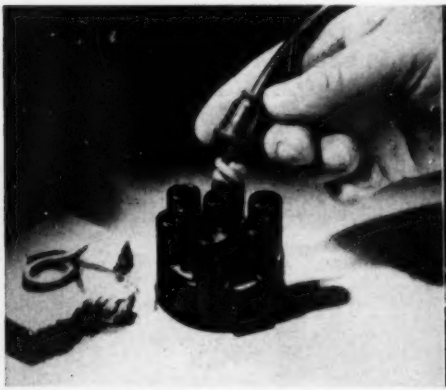
MAKE CANDLES FIT CLOSELY even in oversize holders by wrapping a strip of clay around the ends. Clay itself can be formed into a holder for party candles (right above).

Please turn the page for more tricks with clay.

EMBOSS FOIL with a flat slab of clay instead of a paper pad under it. You'll find the work can be tooled more easily and to a greater depth without tearing.



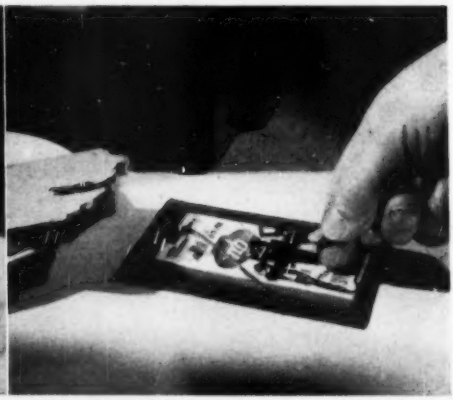
GAUGE HOLE SIZES or internal tapers with clay. Push in a little and caliper resulting plug. To identify threads, wrap clay around a stick and insert, taking impression.



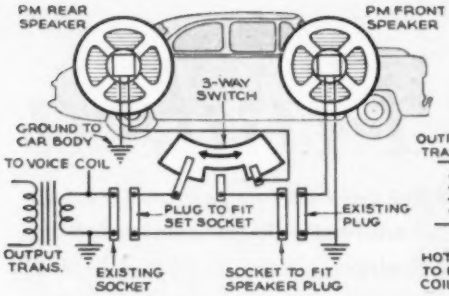
SEAL MOISTURE OUT of high-tension terminals in your car. Wrap clay coil around each wire before pushing it in. Pack clay around battery terminals to prevent corrosion.

CLEAN TYPE with clay to make a good impression. Fold lump after each touch to get a fresh surface. Clay under feet of a portable typewriter prevents creeping.

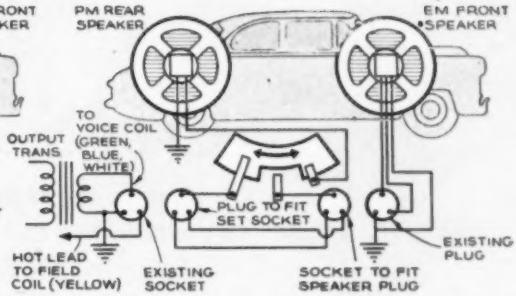
HOLD TILES. To set wall tile easily, especially where you can't hold it by the edges, stick on clay as a temporary handle. It peels off readily after tile is in place.



BAIT MOUSETRAPS. Clay with a little bacon grease kneaded in makes a permanent mouse bait. Effectiveness lasts even for a considerable time, so trap seldom needs new bait.



IF CAR RADIO HAS PM SPEAKER, follow this diagram. If front speaker is connected directly to set instead of through a socket and plug, cut voice-coil lead, wire in switch.



IF RADIO HAS EM SPEAKER, wire your rear speaker this way. Fit the switch into a harness that suits existing connectors so radio can be removed without disturbing wiring.

How to Install a Back-Seat Speaker

A simple wiring job that you can do yourself will add a luxury touch to your car at a cost of less than $4.

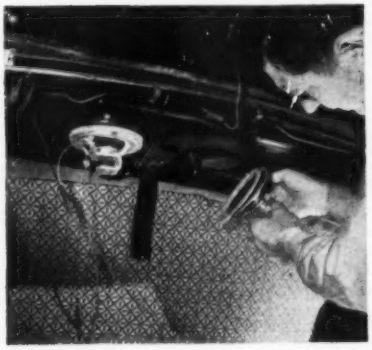
I GET living-room performance from my car radio since I installed a rear-seat speaker. The two speakers together give a fuller, more rounded tone. A three-way switch cuts in either the front or rear speaker or both at once.

You can buy all the parts including the speaker for less than $4. But first determine how big a speaker you can use and whether a round or oval one will fit the space better. In most cars the best spot is in the trunk under the package shelf. In my '48 Nash the manufacturer considerately placed two holes in the frame just right for my four-inchers.

If you use a single speaker, get a permanent-magnet (PM) type about 6″ in diameter. If you want the three-way switching arrangement, buy a wafer type like the Centralab 1483. A bracket for mounting the switch, 30 feet of insulated wire and a pair of connectors complete your shopping list.

Follow the diagram that matches the type of front speaker (PM or electromagnetic) you have in your car. Two leads identify the PM type, three the other. It's easy to spot the voice-coil lead by the color of the insulation, which is either green, blue or white. Run the wire from the switch to the rear speaker under the floor mat or if you prefer, under the car itself.

I mounted the speakers under the package shelf without cutting it. This tends to subdue the high notes and let through only the bass. Grilles are available if you want to cut through the shelf.—*Harry Samuels, Huntington Station, N. Y.*



PAIR OF 4″ PM SPEAKERS was used by the writer. These were mounted in the trunk under package shelf. Wire from the three-way switch was run under car and attached to one voice-coil terminal on each speaker. The other voice-coil terminals were grounded to car body.

CONNECTORS. The male plug fits the existing socket on the car radio. The female socket fits the plug which is on the front speaker. The switch is a three-way wafer type. It can be used to turn on either the front speaker, the rear speaker or both at the same time.

Gus Finds a

The owner of the car had long since given up in despair, but the ancient vehicle's astonishing behavior was a challenge Gus could not resist.

By Martin Bunn

THE traffic light flicked to amber. Gus took his foot from the gas and rolled to a stop just short of the crosswalk. He recognized the grinning safety-patrol boy.

"Hi, Mr. Wilson!"

Gus waved at the white-belted youngster. "Getting any more flat tires on your bike?"

The boy shook his head. "I don't ride down alleys any more since I picked up that last piece of glass." His alert glance slid past Gus, to the rear, and Gus automatically looked up to his rear-view mirror.

Then he stuck his arm out the window and waved it vigorously. The oncoming car, an old sedan, braked to a sudden stop almost on the crosswalk, alongside Gus.

The pretty driver took her foot from the brake and, with utter lack of self-consciousness, spoke to the world in general: "Can't think and drive at the same time!" She seemed surprised when Gus laughed aloud.

"That's right," Gus called. "But a lot of people try. You didn't see that traffic light at all, did you?"

"Stupid of me." She smiled back. "Trying to remember the grocery list I left on the kitchen table."

Gus Yields to Curiosity

The signal went to amber, to green, and the two cars shifted to first gear at the same time. Gus pulled away, but the woman's car stopped short in the middle of the intersection. He stepped on his brake and twisted in his seat to see if she needed help. To his astonishment, she was unconcernedly digging through her purse.

On an impulse, Gus killed his own motor and walked back to the other car, a 1936 Plymouth, he noted, in good shape for a car that old.

"Excuse me," Gus inquired politely. "Is something wrong?"

"The car won't run," the woman said brightly, "and I have to wait a minute."

Gus opened his mouth and closed it again. He watched, fascinated, while she corrected the curve of her lips with a golden capsule, clicked shut her purse and carefully checked her wrist watch.

"There!" she said. "One minute, exactly. Thanks, anyway." Her starter stirred the engine into life and with a pleasant nod she drove away, leaving Gus standing in the middle of the street.

Mystery Car Turns Up Again

It was not much later in the day when the same woman, in the same car, pulled up to the gas pumps at the Model Garage. Gus went out.

"Did you remember all the grocery list?"

She looked at Gus blankly. Then her eyes crinkled in recognition. "Oh, it's you. I didn't know you worked here. No, I couldn't remember everything. I forgot raisins, and I forgot to get gas. You better fill it up."

The gas in the tank, Gus raised the hood to check the oil. He held up the dipstick.

"Low. And it doesn't look too clean. How long since you've had your oil changed?"

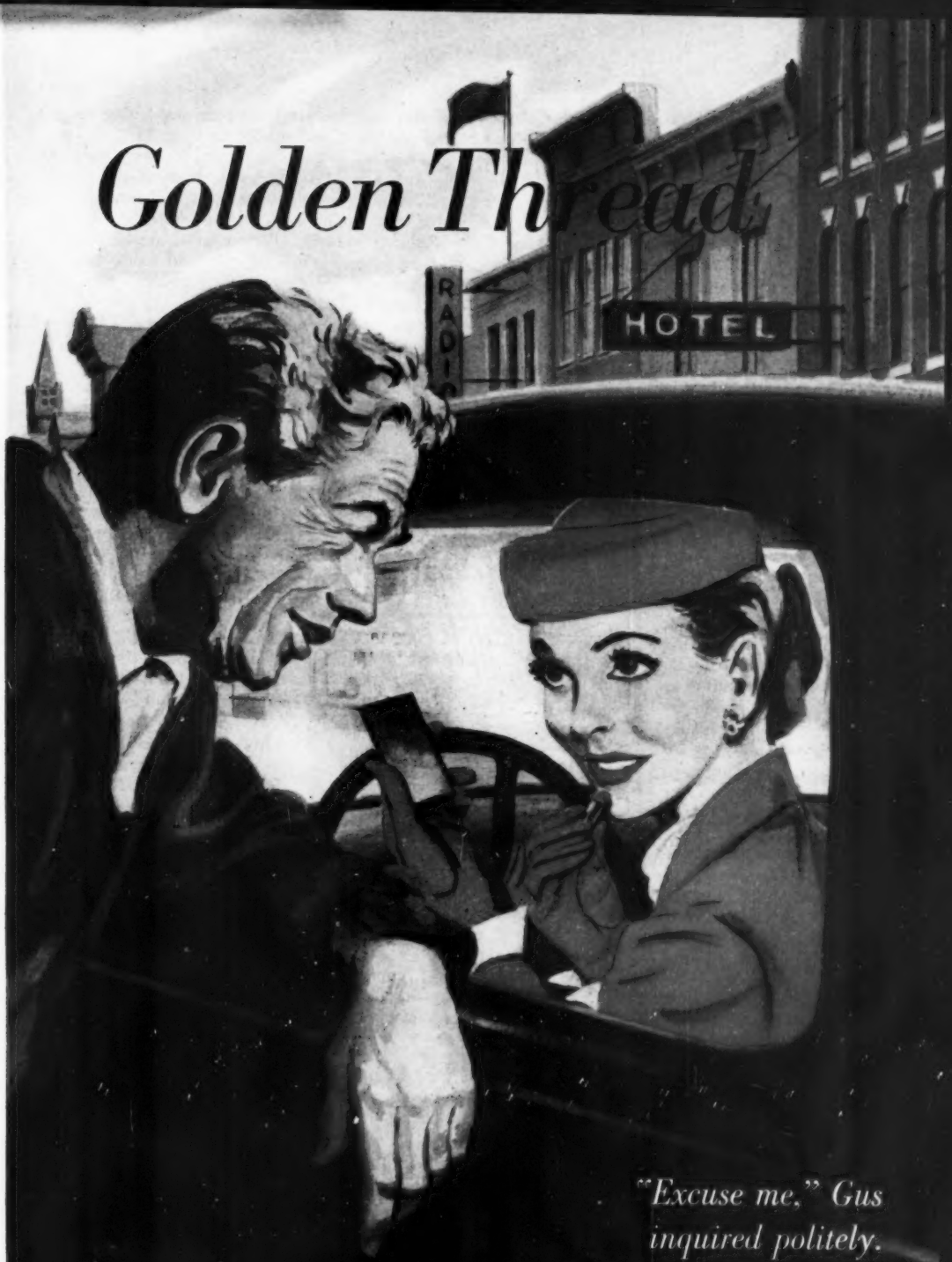
She bit her lip. "I knew there was something I should have done. My husband told me to be sure to change the oil." Her eyes went to her wrist. "And I still have to go back for the raisins."

"Why don't you leave your car here while you finish your shopping? Won't take but a few minutes."

"Okay." She slid out of the seat and headed briskly toward the supermarket.

The buying of the missing raisins took about as long as Gus had expected. The

Golden Thread



"Excuse me," Gus inquired politely. "Is something wrong?"

woman came into the office of the Model Garage with a large shopping bag full of groceries.

Gus cleared a space on his counter for the groceries while she hunted through her purse and paid the bill.

"Uh—where you parked this morning—" he said carefully. "That's a pretty bad corner. If a truck comes sailing up the highway . . ." He pantomimed a crash.

She glared at him. "You're just like all the men—you think women don't know how to behave behind a wheel. I told you that the car wouldn't run. You've got to wait one minute when it stalls."

Gus raised his eyebrows. "Why *one* minute? Why not two, or five minutes?"

She didn't know. "The car's been doing that for the last year. My husband doesn't want to get rid of it; says it's the best car he ever had. But it got so he had to buy another car for his business—he travels a lot—because he never knew when this one was going to start acting up."

"Ever think of taking it to a garage?"

She gave a derisive snort. "We've had it to 20 different garages where we used to live. My husband swore he'd never take it to another one." She gathered up her groceries. "Well, thanks, anyway, for the quick service."

"What happens when it stalls?" Gus persisted. "Does it give you any warning?"

"It doesn't stall; it *stops*." She was definite in her choice of words. "Weeks will go by, and then the old trouble begins all over again. Summer, winter, rain, dry—just stops, at a red light, or even sailing along the highway."

Gus chewed the end of his pencil. "You know, I'd sorta like to check that car."

"Can't afford it. It *is* embarrassing sometimes, sitting in the middle of the street with all those horns blaring at me and men sticking their heads out and yelling about women drivers! But my husband says he refuses to spend any more money trying to find out what makes this car stop, Mr. . . ."

"I'm Gus Wilson."

"And I'm Mrs. Frederick Baumann."

"You say you're new here, Mrs. Baumann. Live very far away?"

"A mile or two. It's too far to walk."

Gus flipped a mental coin and made his decision. He hated puzzles, anyway.

"Suppose I drive you home. I'd like to see just what I can do with your car." He held up a hand. "If I don't find out, it won't cost you a penny. If I do—well, your husband can decide whether he wants it fixed. How's that?"

Pretty Mrs. Baumann hesitated. "Sounds all right. But what's the catch? You never saw me before in your life!"

Gus grinned. "You forget that I *have* seen you before, parked square in the center of one of the busiest streets in town."

Mrs. Baumann laughed. "Fair enough."

When Gus returned after driving her home in his own car, Stan Hicks was just backing the Plymouth out to make room for another car.

"Put that car in the back," Gus called. "I'm going to check it over. Did it start all right?"

Stan nodded. "Shouldn't it?"

"I don't know. Listen to this, Stan," and Gus described the old Plymouth's peculiar behavior.

BEFORE automobiles had tops, the thoughtful motorist carried a "storm apron"—a tarpaulin with holes for the passengers' heads. Two-seater car, two holes. Four-seater, four holes, etc.

Stan Makes a Good Guess

Stan pondered the problem. "If it stops short without a grunt or a kick, I'd start checking the electrical end. But that's only a guess."

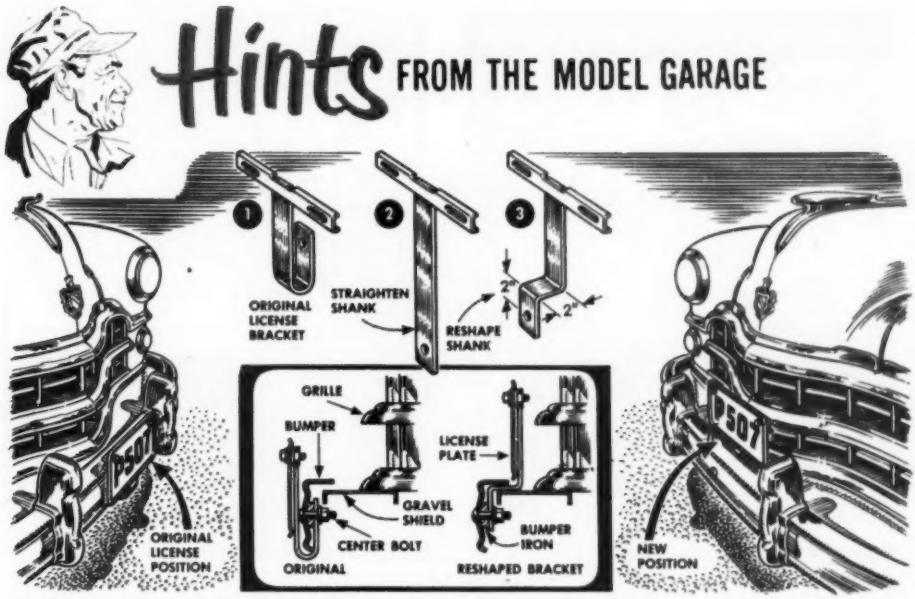
"It's a good one. Well, I'll see what I can find."

When the course of Stan's work brought him back two hours later, Gus was leaning on the front fender staring moodily at the smoothly ticking engine.

"Any luck, Gus?"

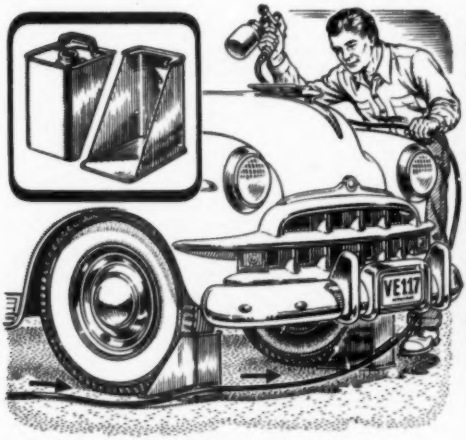
[*Continued on page 248*]

Hints FROM THE MODEL GARAGE

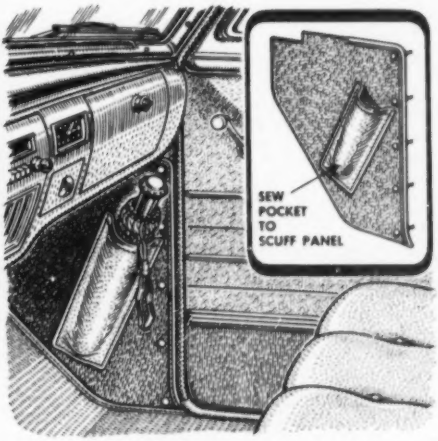


A license plate takes a beating when located ahead of the front bumper. But on some late-model cars that is where the factory bracket forces you to put it.

If your plate is way out front, you may be able to shift it to a safer spot above the bumper by the simple steps outlined here. After the U bracket has been reshaped, you usually will find enough clearance between the bumper and gravel plate so that the bracket can be slipped into position by pressing down on the gravel plate.



Here's a shop trick guaranteed to save tempers every time someone starts dragging an air hose, air grease gun or paint sprayer around a car. Put these diagonally cut oil or antifreeze cans ahead of the wheels and the hose won't snag under the tires.

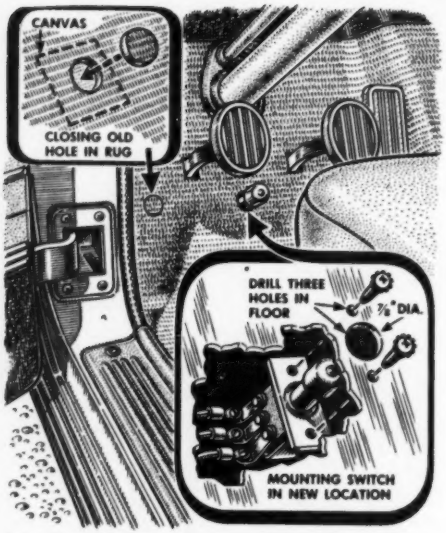


An umbrella holder can be added to your car at little cost. For a folding umbrella, remove the scuff lining from the passenger's side and have an upholstery shop sew on a pocket of matching material. A pocket for a full-length umbrella could go on a door.

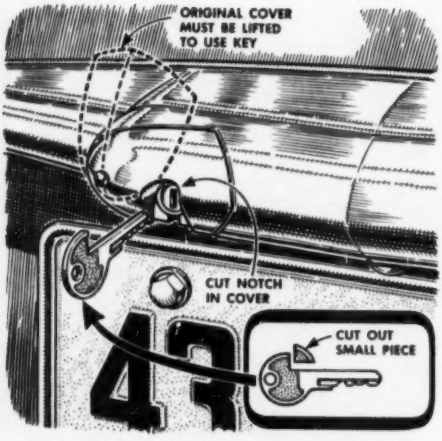
Please turn the page for more auto hints.

MORE Hints from the Model Garage

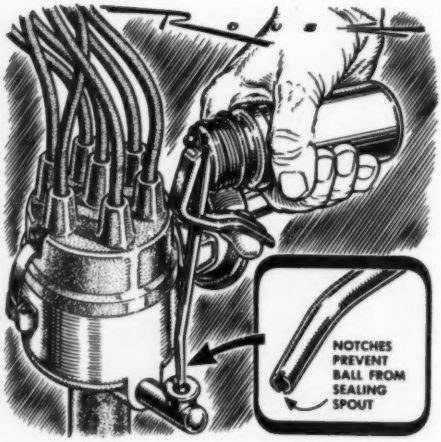
Store winter tires carefully during the summer if you want to get full value from them. Wrap each casing with newspapers. This will reduce the chance of ozone damage, since paper absorbs ozone—one of rubber's worst enemies. Put the tires in a cool dark place (not damp) away from electrical machinery that might generate ozone.



Big-footed drivers have found themselves kicking the dimmer switch unexpectedly in some recent cars because it is badly placed. One who had the trouble was Stewart Rouse, the artist who makes these drawings. He moved the switch as above and now reports that "my size-15 left shoe has plenty of space to graze around in."



To open his trunk, the owner of a late-model Ford reports, it was necessary to hold the lock cover with one hand and turn the key with the other. Modifying the lock cover and key as shown above now permits him to get the lid up with only one hand.



A notch filed crosswise in the end of the spout of a pump oiler will help you get oil into ball-check fittings. Otherwise, when the end of the spout is pressed against the ball to depress it, oil may fail to come out—or may squirt to the side.

Restoring the Body of a Model T

By R. P. Stevenson

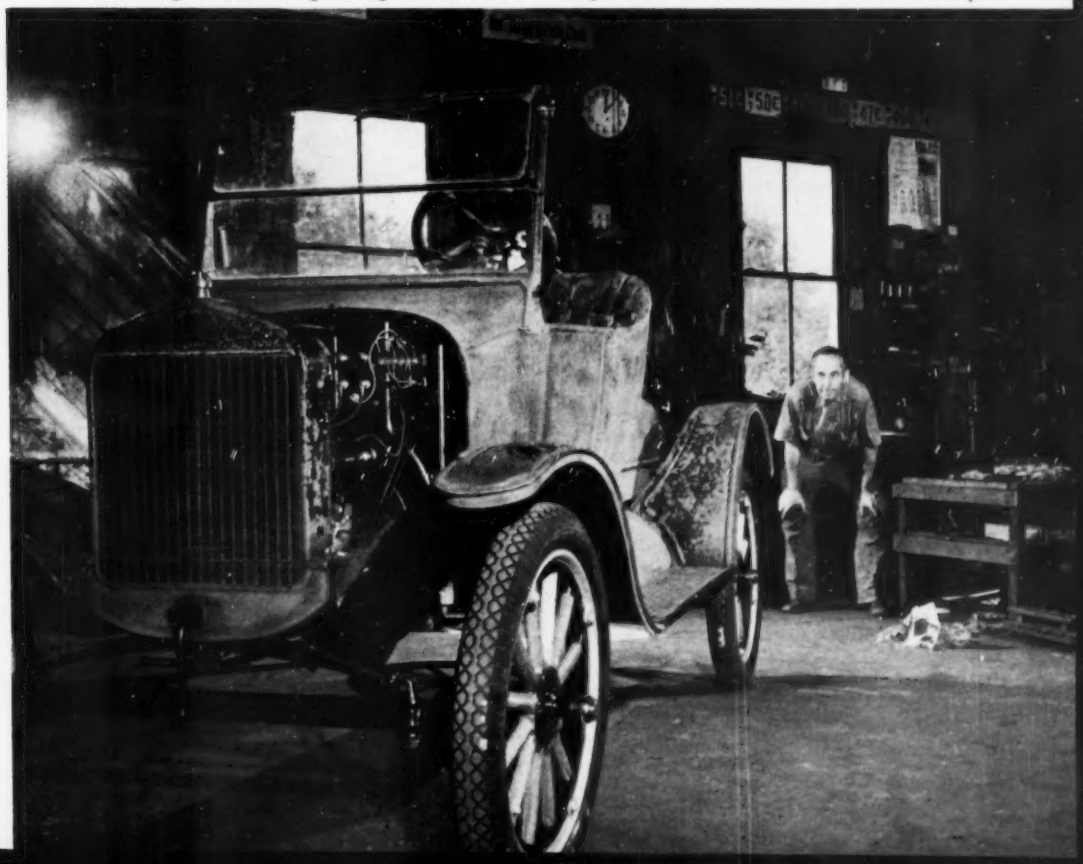
Are the fenders and running boards rusted through? Here are tips on solving this problem, painting the car and putting on upholstery.

WHILE tracking down parts to restore a 1925 Ford runabout I got a strong impression that the Model Ts are coming back.

Obviously these famous old cars never again will fill the roads as they did in the days when a tollgate keeper is reputed to have told one Model T owner that the charge would be three for a nickel. "But I can't wait," the owner protested. "You won't have to," the keeper replied. "A couple more'll be along in a minute."

But even though Model Ts can never become as numerous as they were in the early Twenties, they now are regaining popularity—among hobbyists and others in-

ALIGNING FENDERS. **After repaired fenders, running boards and splash aprons have been bolted on but not tightened, here's how to align them—as it was done in the old days.**



WELDING JOB. A welder can often save a fender that looks hopeless. Sound front lip was cut from rusted-out rear fender at left above and welded to the one at right. This was the only original fender that remained on the 1925 runabout when job was finished. At right above, Fred Schubert works on a front fender. This one wound up as parts of three.

clined to indulge their nostalgia for cars as they used to be.

It has now been more than a quarter of a century since the last of 15,007,033 Model Ts rolled off the assembly line. The Ts of the final years are not old enough to rank as full-blooded antiques at club meets; they are classified as vintage cars. But amateur restorers are beginning to gobble them up.

Fixing Model Ts a Fad

In Brooklyn, N. Y., the Model T parts business of William Scharff, whose stock of factory parts at 1324 Myrtle Ave. is probably the country's largest, is booming. While buying a few parts myself, I encountered another T fan in Scharff's basement shop—George Roll of Metuchen, N. J. Roll, who has a 1925 coupe, started a minor chain reaction in the T world. I needed a key for the rear deck of the runabout I discovered in an old barn. George duplicated his key and sent it to me. I in turn duplicated the duplicate and gave it to two brothers in Flemington, N. J., who have two Ts, a runabout and a coupe.

Most Model T engine parts are comparitively easy to get—perhaps because so many engines are still busy at off-the-road jobs, sawing wood, grinding grain and the like. But body parts are another matter. When I set out to bring a 1925 runabout back to life everything went smoothly until it came time to do something about the rusted-out fenders.

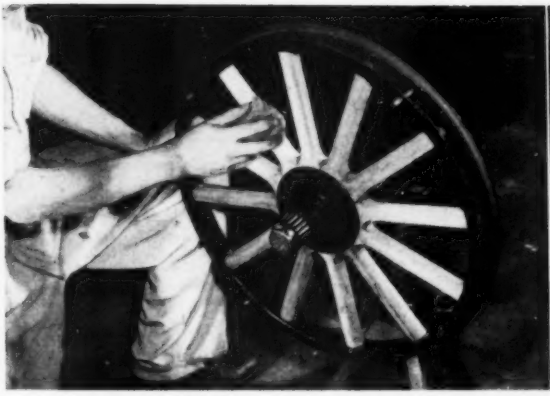
Charley Case, whose experience with Model Ts dates back to 1910, had worked over the car mechanically from end to end. The engine chugged contentedly, like any Model T just out of the factory. The radiator still held water despite 20 years' exposure to rust, and the oval tank under the seat retained all its gasoline. A couple of teen-age spectators waited expectantly in the Annandale (N. J.) Garage to see what would be done with those three strange pedals that stuck up from the floorboards. One figured aloud that the hand brake was the gearshift.

Charley Case climbed behind the wheel, pulled down the throttle, set the spark on the third notch, turned the ignition switch to battery and hit the starter button with his heel. As the engine took off, he quickly pulled down the spark lever and followed with a flip of the ignition switch to magneto. Then, with the characteristic convulsion of low gear, the T began to roll—on its new 30-by-3½ tires ordered from the Montgomery Ward catalog.

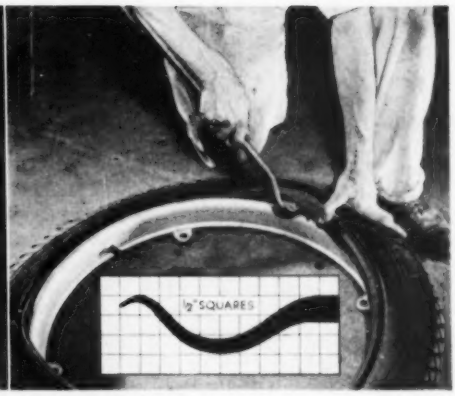
She Steers Fast

Out the open door of the Annandale Garage it went, around the gas pumps, a bit of backing, and then inside the garage again. I retraced the route, stumbling a bit (after 25 years) in manipulating the reverse pedal and surprised at the fast steering.

That was the runabout's first tryout. Nothing more. Until new fenders had been fitted on, its stark, stripped-down condition made any extended public appearance seem too much like walking down Main Street minus your pants.



WHEEL SPOKES were scraped clean and finished with clear varnish. New hub caps cost $1 each if you need them. Frame and axle members were painted while the car was stripped down.



MOUNTING CLINCHER TIRES exasperated lots of Model T owners. About 30 years ago, Charley Case made this special iron to ease the job. Using it, mounting a tire becomes a cinch.

When I first saw the runabout last spring, it had sat unused for at least 20 years. The barn had lost part of its roof. Every rain wetted down the car once more. The sun never had a chance to dry it off. Rust could not have been given a better opportunity to do its work. A car parked in the open would have been better off.

Rust Had Raised Havoc

All four fenders were completely rusted out at the points where they joined the running boards. The lips were gone from the running-board shields. The running boards were ready to collapse into dust.

Out of this mess we eventually retained one rear fender—and that only after welding on a front flange cut from a second one that had rusted through in other spots. Shields are hard to find. But I was lucky. A couple of extras were included among the parts we rescued from the barn, as were one sound running board and rear fender. Welding joined a couple of breaks in the shields.

It should be understood that we might have saved the original parts. (The body, incidentally, was sound throughout, although deeply pitted in spots.) We could have cut the rusted flanges away from the fenders and welded a couple of pieces of strap iron to the sound metal beyond to tie the fenders to the running boards. Careful use of Celastic, the plastic body patching sold in accessory stores, would have restored the fender ends to the original shape and contour. A welder might have tacked strengthening metal to the shields and running boards. A good welder can do wonders as long as he has sound metal to work on. Because of the thickness of the metal used, rust must work a long time before it goes entirely through a Model T body part.

But rather than attempt such repairs, we set out to find two front fenders and a running board that would not require so much work. The hunt carried Charley Case and me into swamps, rickety old barns, woodland and just plain junk yards. It turned up more Model Ts than I ever would have imagined existed within such a short radius of my home in Hunterdon County, New Jersey.

We still are not talking too much about one of our finds—a brass-radiator T buried

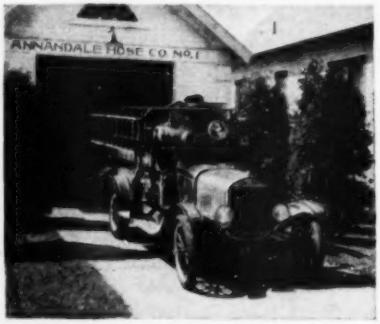
READY TO PAINT. The runabout looked like this the day it went to paint shop. All the body metal was now sound but still brown with rust. Underparts had already been painted.

under a mass of cornstalks. It surely is in bad condition, very bad. But when Ts get into your blood, nothing looks hopeless. So maybe—well, who knows?

Another of our finds is now in the Long Island Automotive Museum run by Austin Clark at Southampton, N. Y. This was a Little Giant truck built about 1912 by the Chicago Pneumatic Tool Co. Austin lost little time grabbing it up for his collection of commercial vehicles.

Besides Model Ts, the hunt also turned up quite a batch of T enthusiasts. Someone told me that Cecil Beaver over in Oldwick might steer me to the fender I needed. He couldn't, but he took time out to show me his collection of Model Ts.

Eventually, we located a car with fenders to match those on the runabout, and the owner was willing to let us strip them off. That was soon done, and our hunt seemed to be finished. But not quite. By the time the rust had been chipped away, the rear flange of the left front fender did not have enough sound metal to bolt securely to the running board. It was no better than the one that we had started with.



MODEL T FIRE TRUCK is still ready for service up the street from where the runabout was restored. It has a three-speed transmission, however, instead of conventional Model T planetary gearing. A carriage-and-wagon builder built the body on a 1925 truck chassis. The truck still answers calls in the village if modern pumper is otherwise engaged.

We then resorted to welding. Using parts of three fenders, Fred Schubert worked out one to match the original. Fred gave the job considerable attention, for over in a corner of his shop sat what by this time I was beginning to expect to find just about anywhere—another Model T, Fred's own.

Ready for Painting

The runabout finally had all its metal parts. Fenders, running boards and shields were in place and aligned. The rotted top had been stripped off and the bows repaired with plastic composition wood. The car was ready for the paint shop.

This job was a disappointment. Better plan to do the body painting yourself if you restore an old car.

With my neighbor, Charley Burrell, lending a hand, I already had done a lot of cleanup work and painting even before the car rolled to the paint shop. Inside and underneath, it looked like a new car.

While the car was being worked over mechanically, I made it a rule to clean up and paint each part before it was put back in place. Grease and rust were scrubbed from all exterior surfaces of the engine and transmission while this unit was out of the frame. Kerosene, a wire brush, a scraper and a fair amount of elbow grease did the trick nicely. After washing the parts with thinner, I coated them with enamel—engine gray on the head, block, valve cover and manifolds; black on such parts as the crankcase, transmission cover, generator and starter. Kemmick No. 11, a heat-resistant enamel, is a good coating for the manifolds.

For easier access, all chassis parts and metal surfaces inside the body were cleaned and painted black before the car was reassembled. Old road tar was chipped from under the fenders, running boards and shields, and the surfaces were also enameled. The muffler and exhaust were about all we skipped.

The wheels got special attention. The rusty clincher rims were cleaned up and then dressed in aluminum paint, simulating their condition when new. The spokes were scraped down to clean wood.

Once clean, the wheels were given a finish like one an old-time carriage maker might have applied. Drop-black paint was first applied to the metal rims and hubs. This is the blackest of blacks, completely without luster. I used the paste type, thinned with turpentine.

After the drop black had dried, I brushed clear varnish, exterior grade, over the entire wheel—both metal and wood. This gave a pleasing luster to the black and a rich mellowness to the wood. The varnish coat was repeated after a light sanding.

But the paint job on the body still disappoints me. If I were starting over, here's what I would do:

First of all, I would sandblast every bit of the body metal, taking off all the rust and old paint. Some areas of my runabout's body were deeply pitted. Sandblasting would clean the rust out of these pits.

Rust now remains in the pit bottoms, breeding more rust. Sooner or later, this will work through to the surface. That is why even now, to get a lasting paint job, I should strip off everything applied by the painter who worked on this car and start over again with a sand blast.

Rust Can Get in Quickly

After all visible rust was gone, I would apply a liquid rust remover and wash the cleaned metal with a thinner. I would restrict this operation to one panel at a time, and follow it as quickly as possible with a coating of dark oxide metal primer. This would seal the metal before rust could start to form. On clean metal, rusting may begin in only 10 to 15 minutes.

Next, I would spray on several coats of surfacer, loading up the metal until it could be rubbed smooth. This is the key to a smooth finish. I would press body putty into dents or pits. Then I would sand and sand and sand until I had an absolutely smooth surface on which to apply the finish coats.

From here on in, either lacquer or enamel could be sprayed on. Lacquer gives the finest finish, but requires hours of sanding between each coating.

Enamel gives a quicker job, and a less expensive one. Provided the surface has been properly smoothed, the results can be very acceptable. But you should remember that an enamel finish will probably dull after about six months.

Surprisingly enough, I had little trouble locating men capable of making a new top and curtains and reupholstering the seat and back rest. Any shop specializing in convertible tops and upholstery work should be able to do a good job for you.

In fact, there is no reason why you shouldn't undertake the top yourself, especially if you have enough remnants of the old one to serve as patterns. You can still buy material similar to the original from shops dealing in upholstery materials. I remember some years ago putting a new top on a Model A convertible. A Model T top would be no more difficult.

When everything is finished and you are bouncing along in all your new glory, at maybe 40 miles an hour, you might begin to wonder if there's not some truth in the observation of the Model T wit that Henry Ford did something really great for the country—made walking popular.

But more than likely you'll reject all such aspersions, and begin dreaming a bit.

What will you dream about?

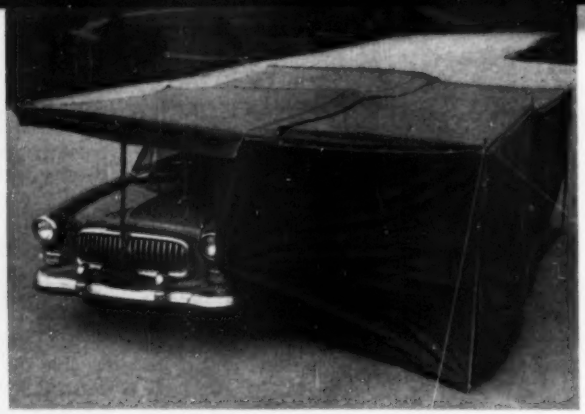
Why, another Model T of course—an even older one.

That's the way it works. END

THE FINISHED JOB. Its new top laid back and encased in a new boot, the restored runabout is seen here as it appears when ready for a leisurely joy ride on a sunny afternoon.

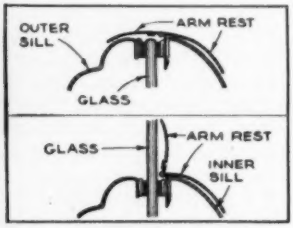
Four for the Road

Planning a car trip this year? These new products are designed to make auto travel more comfortable.

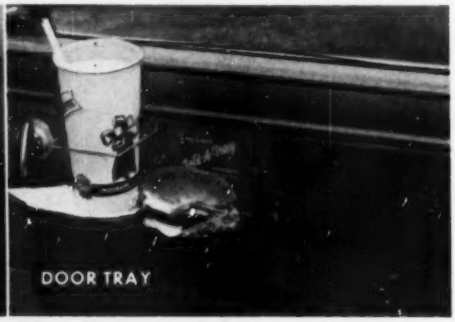


1 Vacuum Holder. A vacuum bottle full of cool water or hot coffee is welcome on any trip. But it's not always easy to carry one safely. The simple holder shown above clamps under the front seat to hold one or two bottles securely and conveniently between the driver and passenger.

2 Take Along a Garage. You can if you wish. The tent above is designed to shelter your car as well as you and your family. Without the side curtains, it also serves to provide shade for picnics. The frame consists of steel tubing that breaks down into sections not more than 4½' long, short enough to be carried in the trunk of the average car. The frame attaches to the car bumpers.

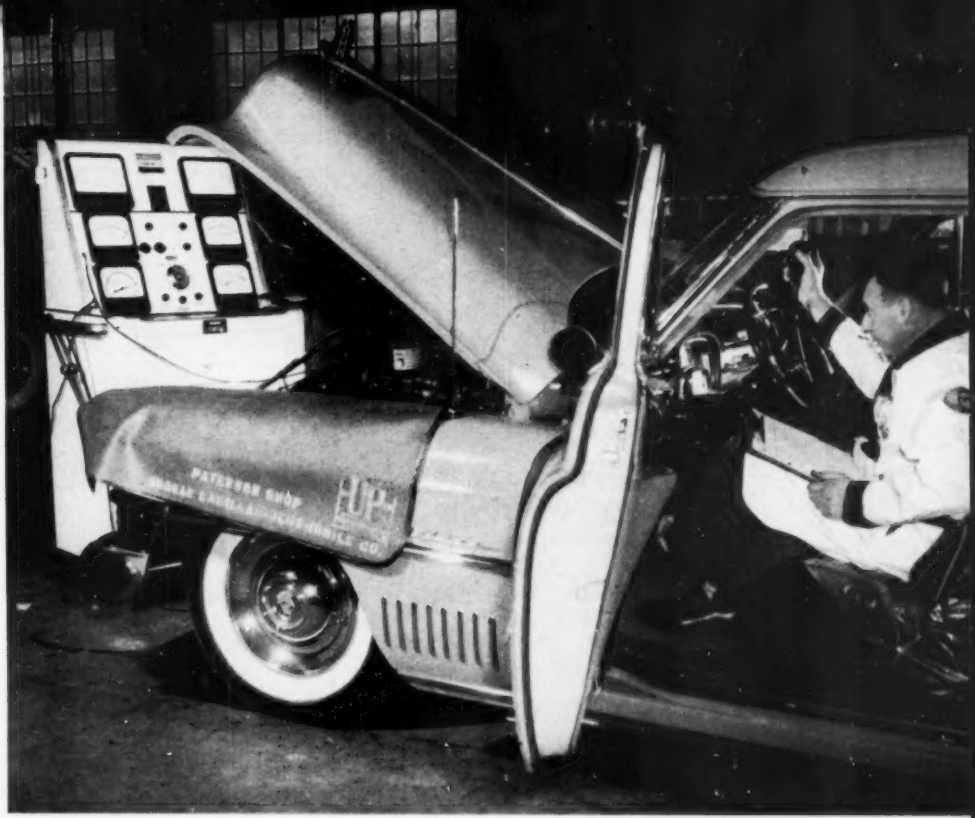


3 Rest Your Arm. On long rides, this item will give your arm a rest. A flock coating provides a velvet-like finish. Sold in pairs, the rest is mounted by inserting ears between the sill and window felt. Sketches show how outer flap raises automatically when window glass is turned up.



4 You Can Use a Tray. Here are a couple of new ones. The Handy Andy dash tray at the left above clamps in place and swings back of the instrument panel when not in use. The door tray, available in colored-flock or chrome finish, is installed by slipping a hooked tongue under the window molding. The shelf folds up out of the way when not in use. A wire holder keeps cups or glasses from falling off.

Further information on these products may be obtained from: 1. Payer Products, 9450 Collins Ave., Miami Beach; 2. Kar-Tent Co., Box 1107, Santa Monica, Calif.; 3. Ess-H-Bee Products, Rock Island, Ill.; 4. S & S Industries (dash tray), 1355 S. Michigan Ave., Chicago; H & H Engineering & Sales (door tray), 322 Virginia Ave., Indianapolis.



Dynamometer operator can "drive" car and watch for troubles to show up on instrument panel.

Stationary Highways Road-Test Cars

You no longer need to drive for miles and miles to check your car. A chassis dynamometer at the garage will do it better and faster.

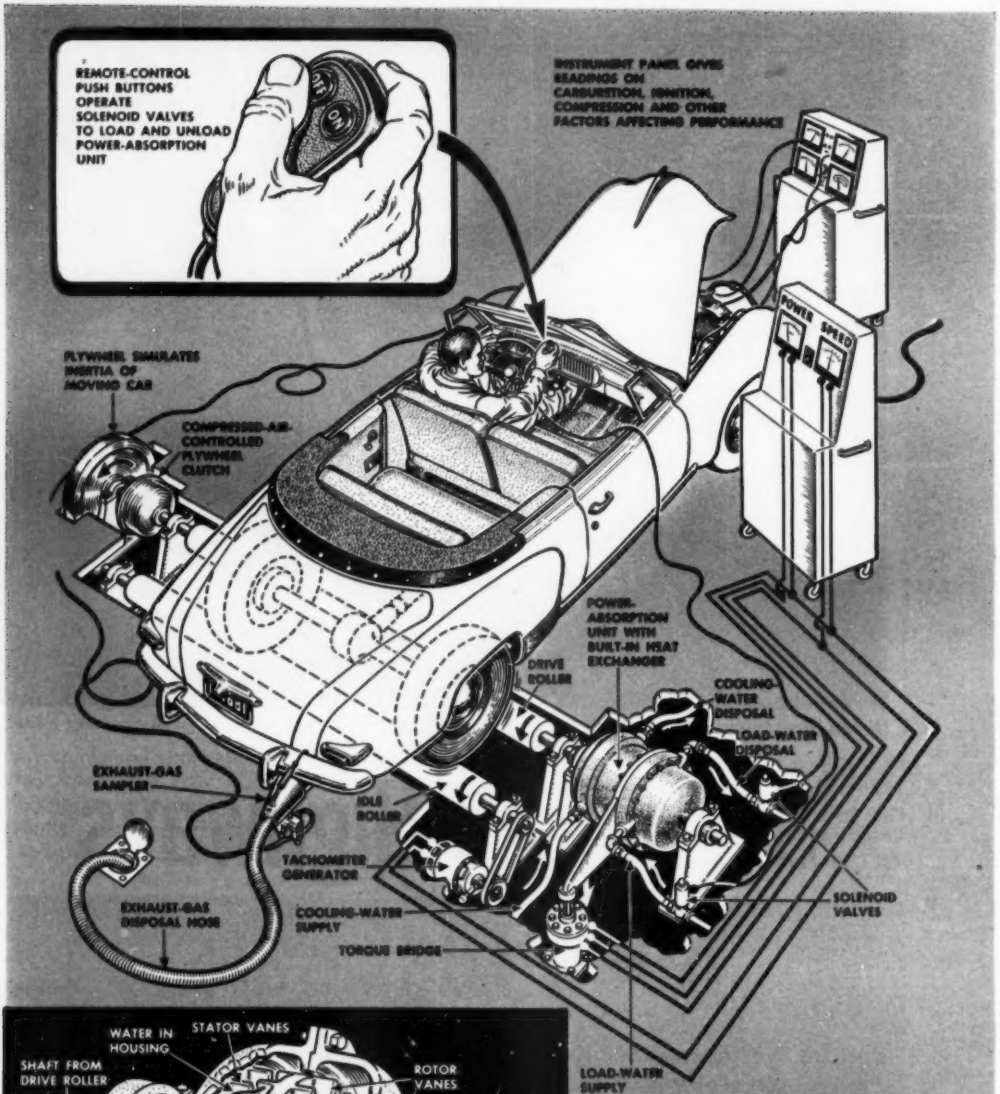
By George H. Waltz Jr.

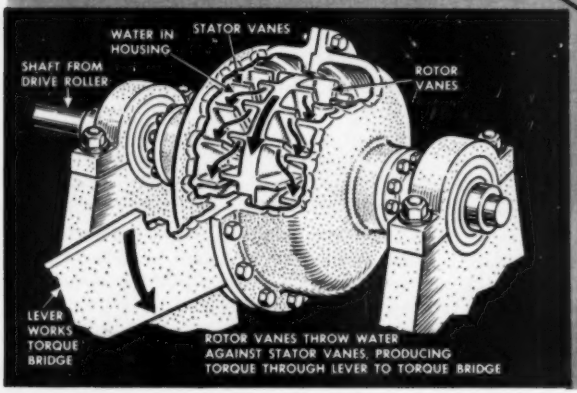
HIGH-SPEED toll roads and traffic jams are making it harder to spot what troubles an ailing car.

Time was when a car owner seldom had a chance to "open 'er up" for more than a short distance. Car troubles that did show up were slow-speed troubles which a mechanic could spot on a ride around the block.

Not so today. On turnpikes, people tool along steadily at 60 hour after hour; in city traffic, they creep and dart. Cars that run perfectly at ordinary speeds often develop temperaments on long, high-speed hauls or when jammed in traffic. Such troubles evade a mechanic on road tests around the block.

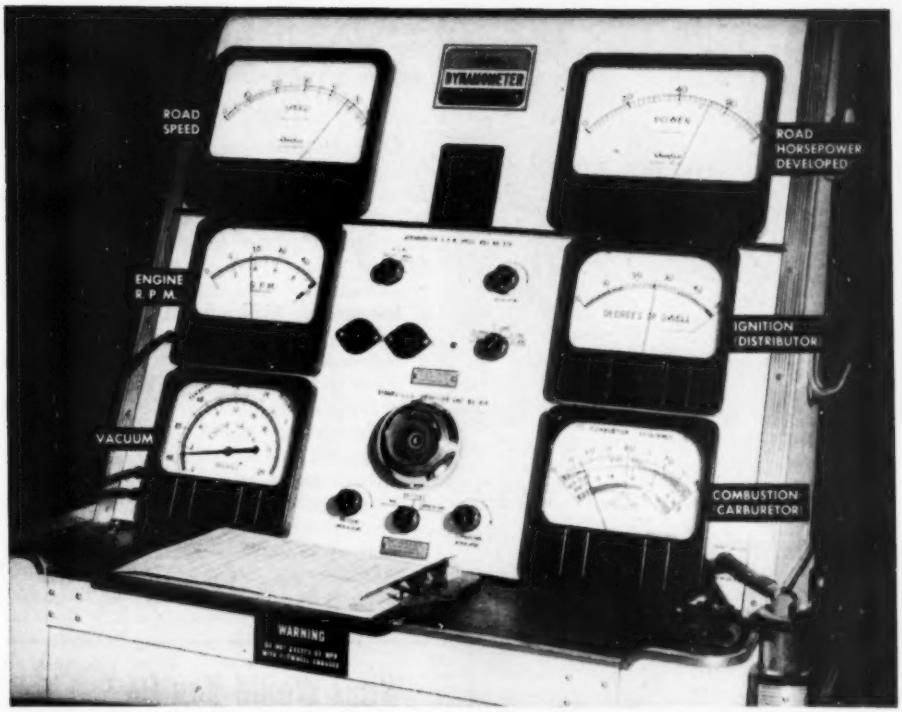
As a result, more and more garages are using car dynamometers like the unit illustrated here, built by the Clayton Manu-



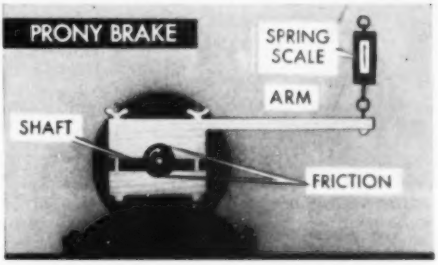


HOW DYNAMOMETER WORKS. Insets show a cutaway of the power-absorption unit and the remote-control push buttons held by the operator during a test.

Pressing the on button increases the load, off button decreases it. The buttons actually operate solenoid valves to add water to or drain it from the power-absorption unit.



OLD AND NEW methods of measuring power are contrasted here. Prony brake (diagramed at right) needs careful adjustment and calculation, does not help mechanic as much as dynamometer with full panel (above). With this tool, you can check carburetor, ignition, power train under varying conditions of speed and load—all without driving from the shop.



facturing Co. of El Monte, Calif. With them, a mechanic can road-test a car completely without moving it off the repair-shop floor. Simply by pressing buttons, he can simulate all sorts of conditions—high-speed driving, fast getaways, stop-and-go crawling, hill climbing. What's more, he can make adjustments—even under the car—during the test.

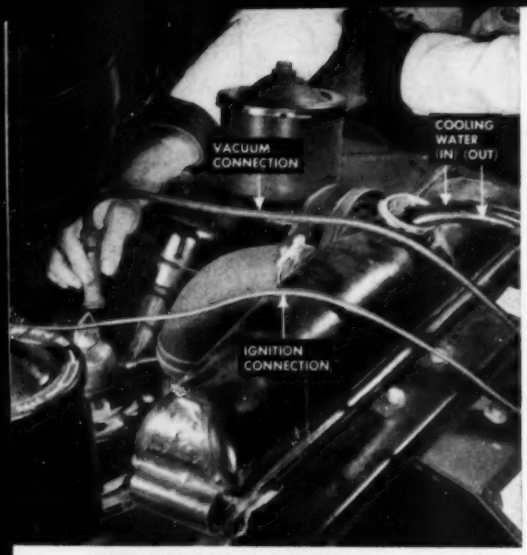
Push Buttons Change Test Conditions

The heart of the dynamometer is the power-absorption unit—the device that makes it possible to absorb and measure the power output of the car's rear wheels. In the Clayton dynamometer it is a hydraulic unit similar to a centrifugal water pump or the fluid drive in a car.

A housing fitted with internal vanes contains a rotor also fitted with similar vanes. The rotor is connected to a drive roller turned by the car's wheels. Varying the amount of water in the housing varies the load that the car's engine must overcome. An idle roller, which also operates a tachometer, cradles the wheels against the drive roller.

As the rotor spins, it churns the water, which tries to rotate the stationary blades and the housing. This tendency to turn is measured electrically by a meter which is calibrated to give readings in actual road horsepower.

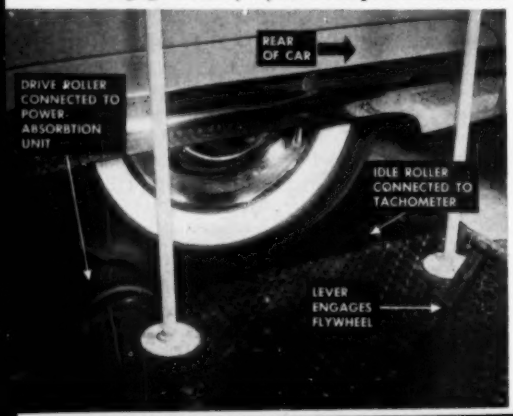
Remote push buttons connected to electrically operated valves change the volume of water and vary the load. To make the



TWO INSTRUMENT CONNECTIONS are made to the engine—ignition and vacuum. Hoses inserted in radiator circulate water to keep engine cool despite absence of normal air flow.

EXHAUST-GAS SAMPLER is inserted in end of exhaust pipe. Sampler is connected to combustion-efficiency meter on instrument panel. Hood over sampler leads gases out-of-doors.

CAR'S REAR WHEELS turn drive roller that is "loaded" or "unloaded" by hydraulic power-absorption unit. The lever at the right is used to engage a heavy flywheel to provide inertia.



stationary road test even more lifelike, a heavy flywheel can be engaged to provide the effects of inertia when simulating fast getaways and coasting stops.

Makes 35 Checks in a Few Minutes

Connections to the car's engine and exhaust provide the instruments with the information they need. They consist of a vacuum connection to the intake and the insertion of a gas sampler into the car's exhaust pipe. To make sure that the car's engine doesn't overheat because of the lack of forward motion, auxiliary cooling is provided by water circulated by tubes inserted in the radiator.

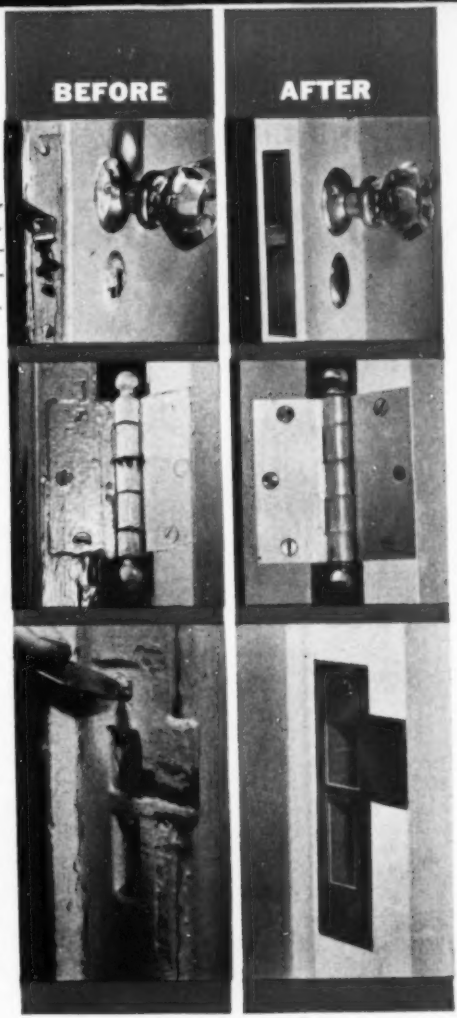
Once a car's rear wheels are in place on the dynamometer's drive and idle rollers and the test connections have been made, the operator can complete 35 essential performance checks in a few minutes. As one mechanic put it recently, "Taking a ride on a dynamometer is like making a long cross-country road test in a car jammed with instruments and fitted with a catwalk so you can tinker without stopping." END

What Would You Do?

There are always some curious people who have to make sure that "Wet Paint" signs mean what they say. After a few of my jobs had been thoroughly fingerprinted, I decided to go along with human nature. Now I hang a paint sample on each job to give itchy fingers something to touch. I put the sample on metal so it won't dry out fast.—S. *Worth, Brooklyn.*

Have you pulled off a smart one lately? PSM will pay for acceptable contributions showing ingenious solutions of problems in the home, shop, garage or camp. It doesn't matter if it's wacky—if it works. Use government postcards only. Contributions cannot be acknowledged or returned.

Slicked-Up Hardware Makes Paint Job Look Better



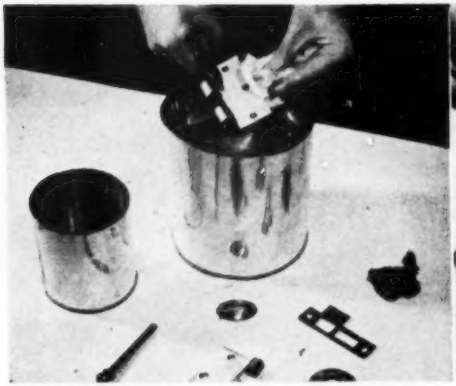
If bygone painters smeared over locks and hinges, you can undo their dirty work with a little paint remover.

THE difference between a good paint job and a bad one is instantly visible in the little touches. A window lock or door strike that has been painted over looks messy; a door hinge festooned with a droplet of congealed paint proclaims a sloppy job.

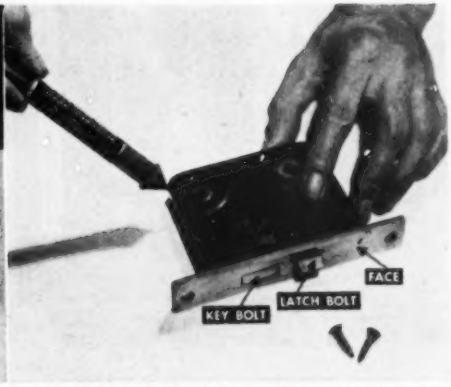
Actually, all hardware should be removed before an interior paint job is begun. This simple preliminary doesn't add much to the total time of the job because then you don't have to paint painstakingly around knobs and keyholes.

However, if a previous painter has painted over the hardware, it's easy to shine it up again. Remove all pieces and soak everything except locks in paint remover or a lye solution. Then burnish the pieces with steel wool. Use new screws if necessary.

If all the hardware is not alike, scribe numerals on the inner surfaces for identification.—*B. Brownold, Cedarhurst, N.Y.*



SOAK HARDWARE in paint remover until old paint loosens. Use pliers or rubber gloves if your skin is sensitive to paint remover.



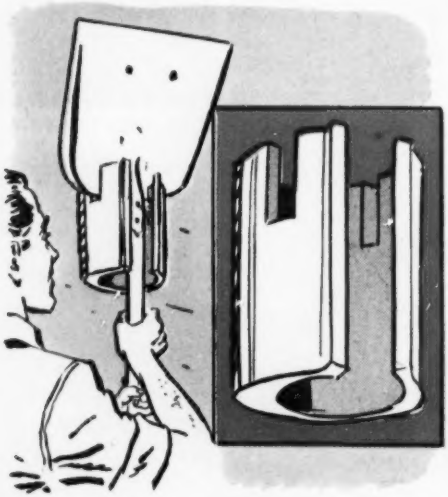
LUBRICATE LOCKS with graphite. Apply paint remover with small brush to get paint off key bolt, latch bolt and face of lock.

KEEPING THE Home SHIPSHAPE

A rack for rubbers can be improvised from a dust pan of the type shown. Hang the pan so that you can remove it for occasional cleaning.

No squat, no stoop, to paint screens when you use your stepladder as an easel. Attach removable wood supports to bring the top of the frame within comfortable reach. Reverse screen to paint lower half.

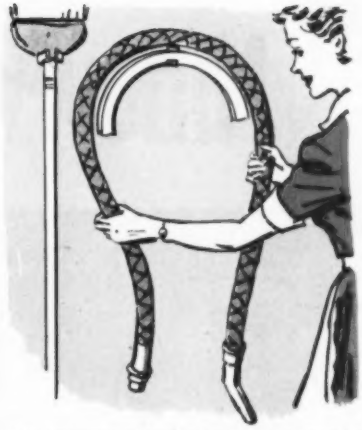
A knotted shoelace that won't yield to blunt fingers or brittle fingernails will give up easily if you have an eyebrow tweezer handy.



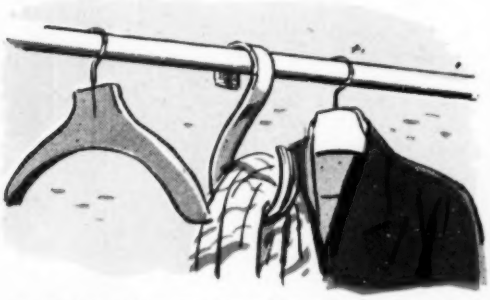
Garden-tool hangers are easy to make from tire casing. Cut pieces 6" long with 2½" slots in the sidewalls. Nail to the wall with slots up to take the tool blades.

Picture windows set close to the ground will get less splashing and stay clean longer if a bed of clean small gravel is laid down directly in front of them.

Bags of cement delivered when the ground is wet can be kept outdoors overnight if they are stacked on a ladder laid flat on the ground.



The vacuum-cleaner hose stores neatly on a rack made from the wheel rim of a balloon-tire bike. Cut rim in half with valve-stem hole centered so it can be screwed to a mounting angle.



An S-shaped hanger, formed from the outer section of a telescoping curtain rod, is handy for fur pieces and fabric stoles. Bend the hanger around the closet rod and around a steam riser pipe to form the two curves. Cover cut end with tape if edges are rough.

Salvage wooden spoons and ice-cream sticks when you clean up after a picnic. They'll make handy garden markers or serve as mixing paddles in the shop.

Trellises come down easily for house painting if they are hung to the siding with screen-door hooks and eyes.

Nine Fancy Finishes

GRAIN IS HIGHLIGHTED in this textured Sea Swirl plywood by rubbing in white pigment. Paint sticks in crevices to form fine outlines and rest is wiped off. Picture frames on wall are plywood of contrasting grain.

Transform Plywood

Modern canned miracles take the arm work and guesswork out of fine finishing. Here's how to show off a good wood or hide a troublesome one.

By Darrell Huff

I LIKE wood, and I like it natural, but the way it grows in the forest is not necessarily the best way to have it in your living room. If you're putting up plywood walls or adding built-ins, you may use a wild-grain wood that you'd like to quiet down a bit. Or maybe you've invested in the fine grain of a rarer type and want to bring it out a little more. In all these cases, you have to give nature a helping hand. Plywood, moreover, must be sealed and coated to keep it clean—even when used "as is."

Now you can get fancy without being fussy. A multitude of modern finishes makes possible one- or two-coat jobs that are on and dry in a few hours. With them, you can hide the grain or show it off, darken a light wood or lighten a dark one, or add clear, brilliant colors in practically any hue you can name.

If you want something different, you can go in for a bleached, pickled or two-tone effect. If you prefer a painted finish, there are special products that will do a good job even on grain that's hard to hide.

1. Clear finishes are designed to leave the wood looking like its original self and yet protect it from dirt and wear. They work best on the finer hardwood plywoods that aren't afraid to show their faces without extra embellishment.

You'll get the clearest result with ordinary flat water-white lacquer, simply brushed on and allowed to dry. One coat is usually enough, but two will give a more durable finish for areas of heavy wear. Steel-wool each coat and finish up with wax.

Varnish will darken wood more than lacquer, but is a better bet where you need a tough, water-resistant finish—kitchens, bathrooms and built-ins of plywood. Use the flat, water-clear kind, apply two coats and then wax.

Wax finishes darken wood still more, but produce a mellow, grain-heightening effect that may help add character to pale, grainless panels. One kind developed in the West especially for redwood also works nicely on many other woods. Simply apply unbleached beeswax dissolved in hot turpentine—two pounds of wax to a gallon of turps. Or you can try a natural-color stain wax.

2. Blond finish is a favorite choice for standard rotary-cut fir plywood, where the chief problem is to soften the violent effect of the wild grain. A bit of pigment will do this without entirely hiding the natural look of the wood.

The easiest method uses ordinary flat white wall paint, thinned with turpentine and applied with a brush or rag. After a few minutes, wipe off the excess with a cloth. If you want to color-tone your walls, you can tint the paint with colors in oil. For maxi-

BLOND FINISH on rotary-cut fir plywood subdues wild grain without hiding it entirely. White paint is brushed on, then wiped off to leave faint trace. Here large panels were scored vertically to give plank effect, hide joints.

PAINT AND WALLPAPER are combined to give these plywood walls interesting, varied pattern. Wallpaper is edged with decorative molding to set it off. Plywood, ripped into narrow strips, is painted to match color of paper.

PENETRATING SEALER is a one-coat, brush-on-wipe-off finish that sinks in deep to seal pores and protect wood. Used on floors, trim and walls, it darkens wood slightly, helps even grain, can be tinted with oil colors or stain.

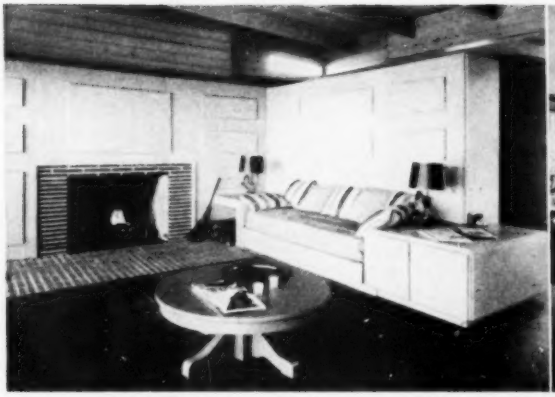
mum durability, finish up with a coat of clear lacquer and wax. I have a plywood wall finished this way, and four pairs of grubby little hands operating for five years have failed to soil it.

3. Stain waxes produce a finish very similar to the blond or color-toned ones, but are quicker to apply since they save thinning and tinting and do not require the coat of lacquer.

You can buy Cabot's stain wax in such ready-mixed colors as white, ivory, gray and blue. You just brush it on, wait five minutes, then wipe it off. The single coat adds color and protection without greatly masking the grain.

If you want a high-luster finish, let the first coat dry overnight, then follow it with

TWO-TONE FINISH accentuates pattern in embossed and textured plywoods. One color is first painted on and allowed to dry. Then second, contrasting color is painted on top (left below). This is wiped off almost immediately, leaving some paint in the hollows and allowing the original color to show through on the high spots (right below). Panel shown is fir plywood faced with a plastic-paper coating, called Rezon, made especially for painting.



PAINTED FINISH is ideal answer on low-cost fir or other plywoods where grain may not be of sufficient quality for show. It is also effective when combined with natural wood, as here, to relieve monotony of a one-finish room.

NATURAL FINISH on this plywood ceiling gives rich, handsome sheen to ordinary rotary-cut fir with only one coat of clear lacquer, simply brushed on. Lacquer adds no color to wood, but will darken slightly in time.

a coat of clear stain wax, buffed to a gloss.

4. Wood stains are fine for mild-grain hardwoods, but in the darker shades like oak, walnut and mahogany produce an entirely too violent effect on the wilder rotary-cut fir. They are used chiefly to deepen the tones of a matching wood—oak stain on oak, walnut stain on walnut—or to give a dark-wood appearance to pine and other lighter woods. It's a good idea, however, to avoid trying to change one wood into another; the results are often weird.

The soft-hued stains—light grays and driftwoods—can be used on nearly all woods and may even work well on rotary-cut fir. So may Color Rez, a stain made especially for plywood.

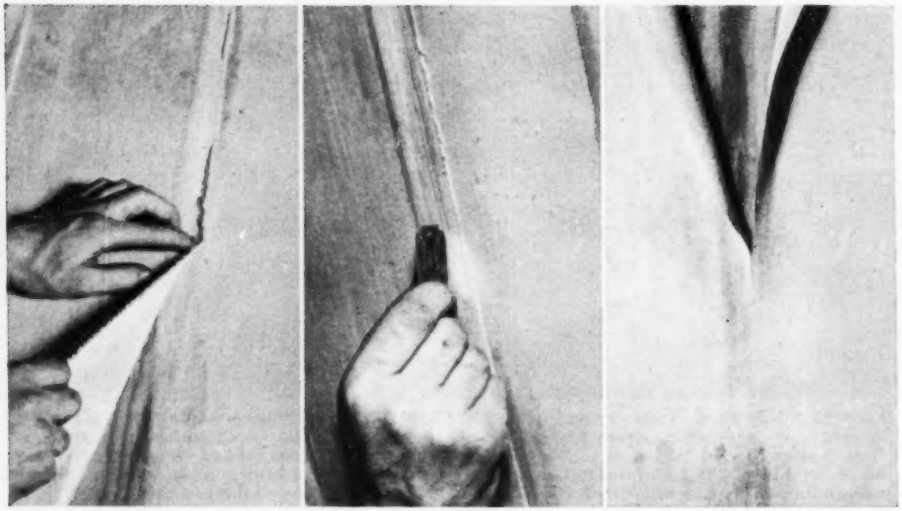
A good routine for any stain is to begin with a thin coat of resin sealer, which will help the stain take more evenly. Then apply the stain and follow with a coat of reduced clear varnish. Fine-sand this lightly and finish with a coat of flat or gloss varnish.

5. Color Grain, made by Adelphi Paint & Color Works, Ozone Park, N.Y., is a special transparent wood stain that comes in a number of brilliant, unusual colors such as ruby, chartreuse, turquoise, black, rose, amethyst and blues and greens. It may be a trifle too bright over an entire wall, but will add a striking touch to small areas like cornices, furniture, built-ins and doors.

Brush on the stain, then wipe it off to let the grain show through. One coat produces a glossy, durable surface.

6. Bleaching is pretty laborious for

FELT LINING makes smooth backing for wallpapering over plywood. Use standard wall liner or ¾-lb. deadening felt. Cut strips slightly longer than wall height, then coat both wall and felt with ordinary wallpaper wheat paste to which gelatine size has been added. Hang strips with neatly butted edges (left below) to avoid overlaps that would show under paper. After short drying time, wallpaper is applied over felt in usual way (right below).



FOR SMOOTH PAINT JOB, line plywood with canvas or muslin, available at paint stores. Prime panels first with thin coat of flat wall paint, then apply cloth with wallpaper paste, overlapping the strips about 1" (left above). Draw a sharp razor blade down middle of overlap (center). After waste is peeled off, the cut edges of cloth form neat butt joint that won't show through paint (right). Stagger joints in cloth away from joints in wood.

large areas, but produces results not obtainable with other finishes. It turns most woods white or a very light gray.

Use a prepared bleach, available at paint stores, or one of the common household types like Clorox. This must be brushed or wiped on in large quantities and repeated until a deep, uniform bleach is obtained. Wear rubber gloves and protect your eyes —if it will bleach wood, it will bleach you.

Because the wood gets well soaked in the process, allow a good 48 hours or more for thorough drying and then fine-sand the raised grain. Add a coat of lacquer sealer and finally one of clear lacquer.

7. Pickling is ideal for open-grain woods where pigment can be worked into the pores to highlight the grain. It is most often used on oak and also on elm and Korina. It produces a "wheat" effect on Philippine mahogany and a blond effect on cedar and birch.

Begin with a coat of white resin sealer, thinned with about one pint of turpentine to the gallon. Brush it on, wait five minutes, then rub it into the pores as you wipe off the excess. Let dry for 24 hours, then fine-sand lightly, apply one or two coats of clear flat or satin lacquer, rubbing with steel wool after each coat, and finish with wax.

A wood stain called Satinstain is nicely adapted to several shades of pickled finish on oak plywood. First coat is Satinstain in weathered gray, brown or—for something really startling—ebony. Follow with white wood filler, rubbed in and wiped off, and seal this with one or two coats of clear satin lacquer.

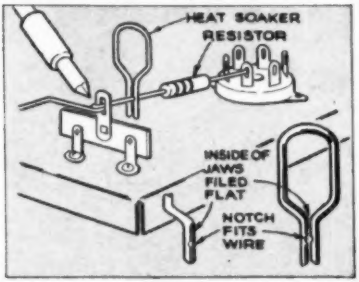
8. Painting plywood is not as simple as it sounds, for the grain, especially in the softwoods like fir, insists on showing through. You can bat it down where it belongs with a base coat of resin sealer (Rez, Firzite), followed by two coats of regular flat wall paint.

For a really slick paint job, the only reliable answer is to cover the plywood first with fabric, as shown in the photos. This may sound like a lot of work, but the cloth is cheap, easy to put on, and since it eliminates much of the patching of seams and nailheads that you'd have to do otherwise, may actually turn out to be a short cut.

9. Wallpaper adds a decorative touch to any plywood wall, and is often combined with natural-wood or painted areas.

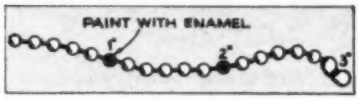
The plywood makes an ideal backing for the paper since it is hard, smooth, won't crack like plaster and takes picture-hanging nails without leaving large holes that ruin the paper. The photos show how to apply the wallpaper over wood. END

Clamps Soak Up Heat



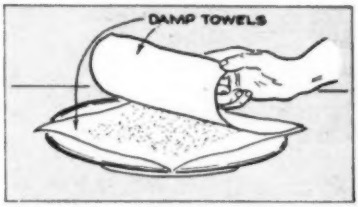
WHEN soldering small radio parts, especially those in cramped spots, it is important to prevent damage from the heat of the iron. Homemade clamps of heavy copper wire soak up heat before it reaches the part. After the joint has been soldered, the soaker can easily be removed with pliers.—*Hugh Lineback, Stillwater, Okla.*

Key Chain Makes Ruler



AN IMPROVISED ruler can be made from a key chain. Paint the inch marks with enamel. If necessary, you can also mark the locking link.—*Frank Shore, NYC.*

Test Your Leftover Seed



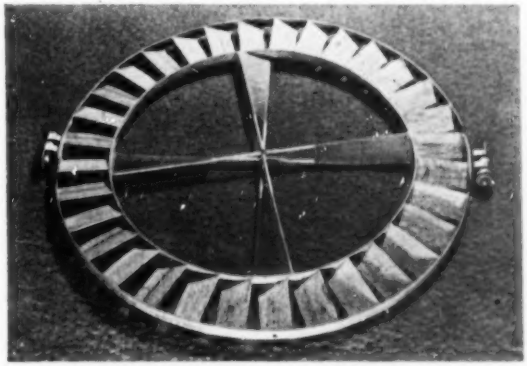
TO MAKE sure the garden seed you bought last season but didn't use will germinate if you plant it this year, try testing it first. Lay a few seeds between two dampened paper towels, allowing them to stand in a warm room for five to 10 days. Keep towels moist. If three-fourths of the seeds begin to sprout, it is safe to plant them in your garden.—*Blanche Campbell, Las Vegas, Nev.*

No Question About This Saucer

A LOT of people have reported seeing flying saucers, but Lawrence Conover of Iowa City can back up his claim by showing you the saucer itself and making it fly.

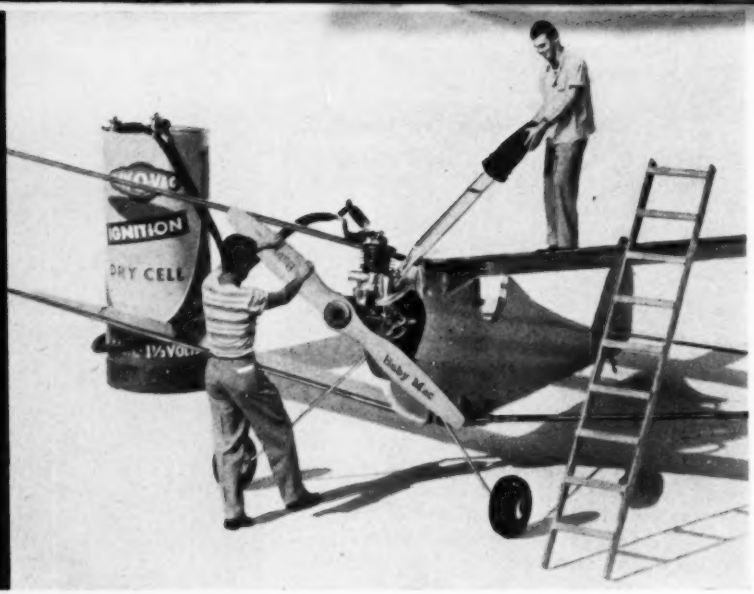
Powered by two Jetex 50 rocket units, his 13" balsa and tissue-paper model is flown off a launching tower. When the fuses are lit, it spins faster and faster until it takes off almost straight up. Exhaust smoke funnels down from center.

As the power dies, the saucer slows down, stops, then begins to turn in the opposite direction—rotating down to a soft landing.



TWIN MOTORS spin this saucer, Conover's sixth, to heights as great as 300'. It weighs only .35 oz. without the rockets. Motors flew off earlier models, and centrifugal force broke up balsa parts in mid-air. This successful version is reinforced by steel wire around rim.

Tips on Running Midget Engines



Palm-size model power plants come ready to go. It's the owner who may need breaking in.

By Jack Wilson

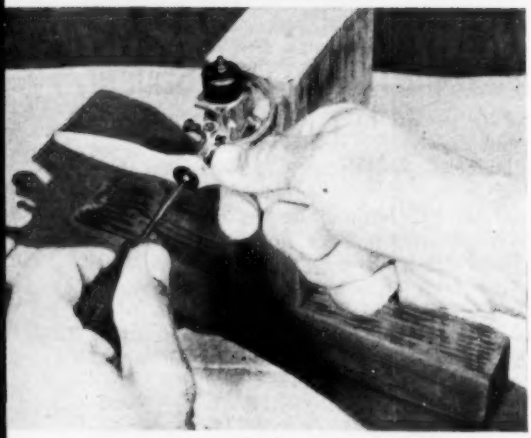
THERE was a day when you had to break in new model gas engines. But modern midget buzz plants are ready to fly when you take them out of the carton.

Nevertheless, you have to get acquainted with them to use them successfully. If midget glow-plug engines are new to you, break yourself in and give your perky little gas burner a sporting chance. Mount it on a test block and run through a few tanks of fuel before you show it off.

Tiny as they are, these one-lungers make an ear-tingling racket. Stay friends with your neighbors by running yours when they aren't at home—or get a few hundred feet away from easily jangled nerves. The exhaust may spray oil-mixed fuel, so stay clear of painted or concrete surfaces.

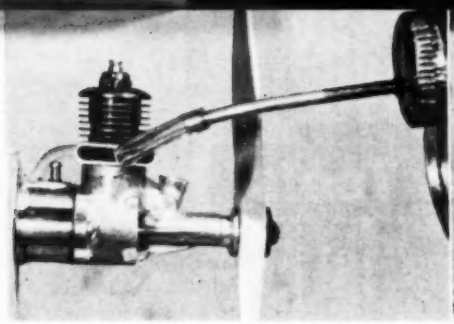
In removing or replacing glow plugs, be sure to hold the cylinder head with the special wrench provided. Modest wrench pressure is enough to seat the plug firmly.

Dirt and grit score the innards, so keep your engine clean. Flush it with denatured alcohol, then oil it lightly to prevent rust. Don't take it apart unless absolutely necessary. When storing an engine, wrap it in a lightly oiled, lintless rag. If you're flying it on a dusty field, take along a big sheet of cardboard to work on.

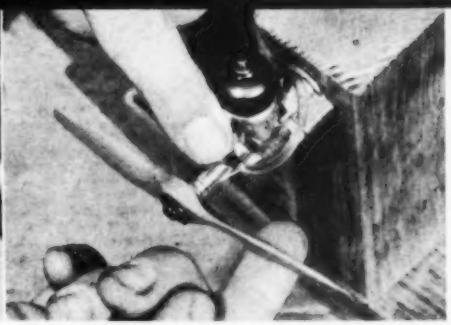


Test stand is a T shape of two-by-four lumber. Mount the engine with wood screws that go at least ½" deep. Select the propeller recommended by the engine maker (average one is 6" diameter, 3" pitch for half-A engine). With the lock screw or nut loose, tap the prop counterclockwise until it lies horizontal. This makes for easier finger flipping, helps prevent prop breakage on rough landings. Then grasp prop and shaft hub tightly to keep the shaft from turning, and tighten the screw or nut. Be sure it's snug; engine may overrun and seize if prop comes loose in flight.

Close needle valve by turning it clockwise as far as possible without forcing. Then unscrew it 1½ turns. This starting position varies with different engines, but 1½ turns is a good setting for trials with most of these midgets.

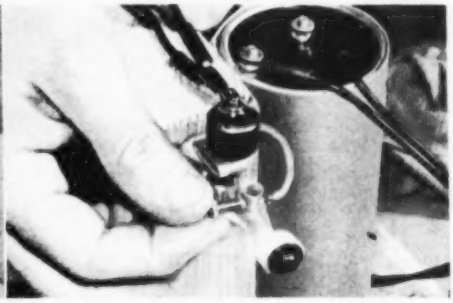


Fill the tank with one of the prepared fuels recommended by the engine manufacturer. Then prime the engine by squirting two or three drops of fuel into the exhaust port, with the piston all the way down.

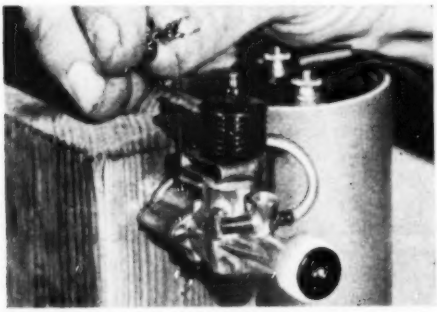


Holding a finger over the venturi (air intake), turn the prop *slowly* just enough to fill the transparent fuel line with gas. One turn should do it. More may draw in too much fuel and cause troublesome flooding.

Hook up the battery to the glow-plug terminal. (A fresh battery is essential.) Support the test stand with the left hand and, with the right index finger against the underside of the right-hand blade, press up until you feel compression. Then flip the prop smartly around counterclockwise. Unless you overprimed, it shouldn't take more than three or four such attempts to start the engine humming.



Once it's running, adjust the needle valve immediately, if necessary, to keep engine perking at a moderate speed. You judge this by ear. At too slow a speed, it will seem to miss and run unevenly. Running too fast, it will scream at high pitch. Better hold down the r.p.m. at first by keeping the mixture rich; save the hot runs for flying. Like the big mills, these little engines wear out faster at high speeds.



Disconnect the battery promptly as soon as the engine is running smoothly. You'll save both battery and glow-plug life. The heat of the explosions keeps the plug element hot once the engine is going. Try turning needle valve to get both slow and high speed, but don't leave it at either extreme. Low speed may cause excessive vibration; high speed, rapid wear and overheating. A small tank will run dry in about 1½ minutes. A few runs will make operating the engine almost second nature, and you're all set for some flying thrills.

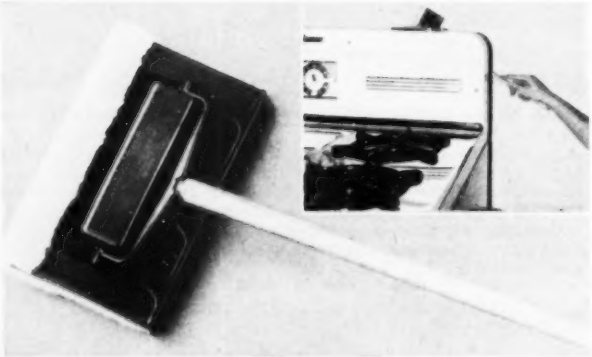
Tips on Trouble Shooting

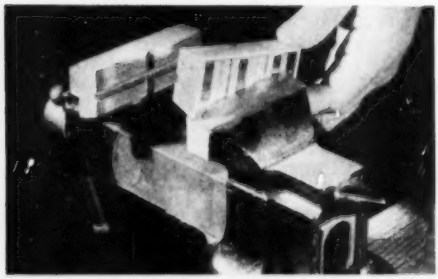
- If engine refuses to fire and sputters fuel from the exhaust, or fires mushily and quits, it is flooded. Clear it by flipping the prop around a few times with the needle valve closed.
- Noisy single pops but no running usually mean priming fuel is used up. Squirt another drop or two into exhaust.
- If the engine stops after a short run, it probably didn't get gas after the priming charge ran out. See if fuel is visible in the line. If not, put your finger over the air intake and turn the prop over. If the line stays dry, it may be stopped up—or tank may be empty.
- If fuel supply is okay but engine still doesn't fire, test the starting battery by hooking it to an extra glow plug. This should heat to a bright glow at once. If battery checks this way, take engine plug out and see if it is fouled or has a broken or burned-out element.

New Tools

1 Magnifier Carries Own Light. You can use this lighted magnifying glass on a workbench or desk, remove it from its base and hold it in your hand or bolt or screw it to a shop machine or wall. Used on a machine, it serves as a guard against flying chips as well as a light source. It is 8″ wide, 10″ deep and 12″ high with a 4″-diameter lens of two-power magnification. It is designed to take a 40-watt bulb.

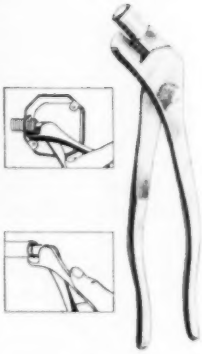
2 Paint Pad Reaches Tight Spots. Hard-to-reach wall areas—behind refrigerators, kitchen ranges or radiators—can easily be painted with this pad that measures 3″ by 5″. With the 16″ handle removed, the Tite-Spot can be used to paint stair risers, cabinet interiors or other cramped spots. A removable plastic blade guards one edge of the pad, letting you paint right up to but not on ceilings.



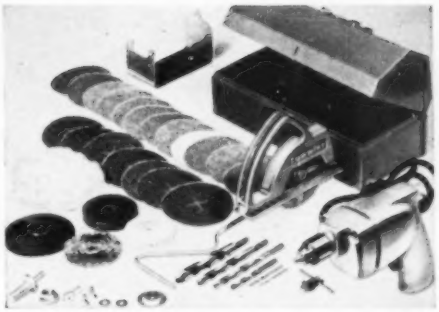


3 Magnets Hold Soft Jaws in Vise. Three permanent magnets set into the backs of these soft jaws securely hold them to the vise. The jaws can be removed by simply lifting them off. They are made in four sizes, for vise jaws of 3″, 3½″, 4″ or 4¼″ widths.

4 Pliers Do Three Electrical Jobs. One jaw of these pliers is a roller that turns freely inside the lock nut of an outlet box. The other jaw (top sketch) catches and turns the lug of the lock nut. Burrs on pipe can be removed by twisting the pipe between the roller and the fixed jaw (center). Besides cutting wire, the pliers also will skin wire pulled between the jaws (bottom).



5 Reamer Also Drills Sheet Metal. Inside burrs can be reamed from pipe or conduit with this tool or it can be used to drill holes in sheet metal. The reamer capacity is ⅜" to 2". The spiral-reamer unit is sold alone or with a ratchet handle.

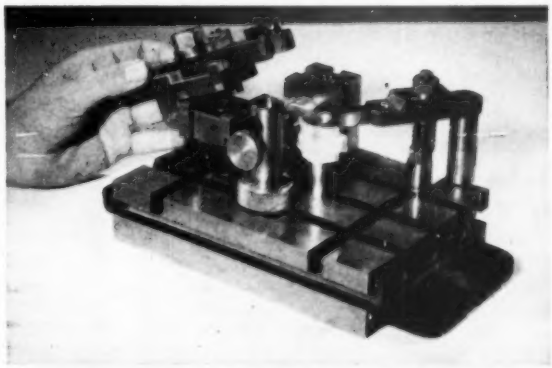


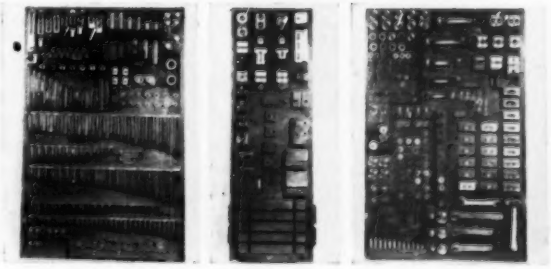
6 Offset Tin Snips. The handles are above the work, giving the operator better control and eliminating the danger of cuts from sharp-edged metal. The stop, away from handles, prevents pinched fingers.

7 Drill Kits. Eight new electric-drill kits for home handy men are being offered at prices from about $20 to $45. Each kit is designed around a ¼" drill and four of the kits contain circular-saw attachments. Among the home jobs the kits will handle are polishing furniture, buffing silver, cleaning pots and pans, mixing liquids, sanding, grinding, sawing and, of course, drilling wood or metal.

Further information on these tools may be obtained from: 1. Owosso Engineering Co., 300 Clinton St., Owosso, Mich.; 2. W. P. Fuller & Co., 301 Mission St., San Francisco 19; 3. Magne-Grip Tool Co., 4900 W. Madison St., Chicago 44; 4. Utica Drop Forge & Tool Corp., 2500 Whitesboro St., Utica 4, N.Y.; 5. Ridge Tool Co., Elyria, Ohio; 6. J. Cartwright & Son, Malaga, Calif.; 7. Cummins-Chicago Corp., 4740 N. Ravenswood Ave., Chicago 40.

450-Piece Kit Prefabs Jigs

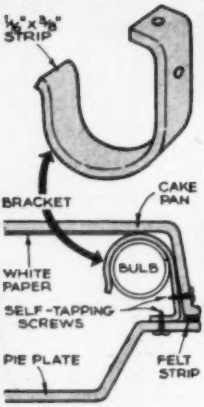




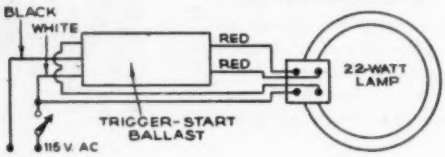
THIS system of holding work for milling, drilling, grinding, boring and other precision machining operations consists of 450 graduated elements and fastenings (below right) that can be assembled on slotted base plates. The jig (above right) can be disassembled and the elements re-used to build other fixtures. One of the main advantages of the method is said to be its speed in jig building. According to the company, a fixture which takes 40 hours to build by ordinary methods can be built in three to four hours with this set. Wharton and Wilcocks of America, Inc., 17 Battery Pl., NYC, sells it.

Fluorescent Lamp Makes Cold-Light Photo Unit

LIGHT IS BOUNCED off white disk, assuring even illumination. Ballast and switch are in a box that can be mounted permanently on wall. Four-prong plug makes enlarger detachable.



LOW HEADROOM needed by cold-light unit makes it ideal for cellar darkrooms. Prints are crisper and have more contrast, exposures are shorter than with incandescent light.



You can easily up-date your old enlarger to cold light—or build a homemade one with this modern feature—by using a circular fluorescent lamp. Total cost is about $6.

You'll need a 22-watt, 8¼"-diameter lamp, a trigger-start ballast, a 9" cake pan, a 9" pie plate and three homemade clips. An ordinary ballast will do if you make exposures with a lens or swing-aside shutter, but the trigger-start ballast gives instant on-off light control with just the switch.

Wires can be soldered directly to the lamp prongs if you work fast so as not to overheat them. Cut an opening in the pie plate a bit bigger than your negative (the lamp covers 2¾" by 3¾" adequately). Mount the brackets in the cake pan with self-tapping screws and cement a disk of white cardboard inside. A felt strip seals light leaks.—*Karl Haller, Millington, N. J.*

Invert Reel to Wash Film

If you wash roll film in the developing tank, turn the reel upside down first. This will hold the film higher above the tank bottom, out of the lowest layer of hypo-loaded water, and provide better circulation. —*Ken Murray, Colon, Mich.*

Old Bookcase Is Dustproof Shelf

Storing your film-developing equipment in a dustfree place is a big help toward getting spotless negatives. A glass-front sectional bookcase unit makes a good cabinet for the purpose. Once popular, these units can be picked up cheaply in secondhand stores (mine cost two dollars). The glass door shows at all times whether items are in place.—*Harry L. Truchelut, Atlanta.*

Natural tripod is easily made (right) by bracing both elbows on fence rail or other base and holding camera against your cheek. If rail is low, finding something to sit on will save wear and tear on your elbows.

Sit down and brace one or both elbows on your knees. You'll be well on your way to steadier pictures. If you use a single elbow, as in photo above, crossing your legs will help a lot to provide the stability you want.

How to Hold a Camera

A WOOD turner must steady his chisel on the lathe rest. And a good photographer supports his camera solidly, too—on a tripod if possible, otherwise by bracing his arms. Beginners should stick to shutter speeds of 1/50 second or higher for hand-held shots. But a little practice with camera-steadying tricks like those shown here will let you snap sharp pictures at 1/25 or even 1/10.

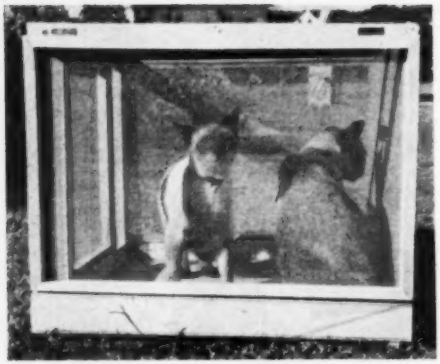
Lean against some convenient support for extra steadiness. A post, as shown below, or tree can be a big help. The side of your car often comes in handy when you're making travel shots.

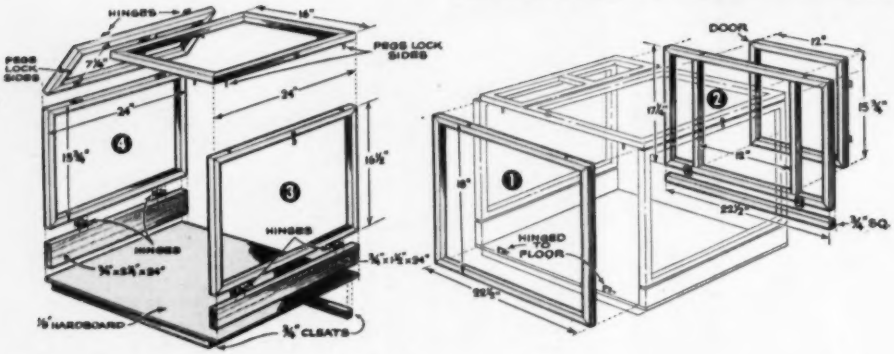
Brace camera against your body for waist-level shots with reflex or box type. Just before taking picture, inhale and hold your breath until after the shutter has been snapped. That way your breathing won't jar the camera and cause a blurred picture.

Hold camera against cheek for eye-level shots and keep elbows close to chest. If you can't lean against something, your stance should be balanced but not strained, with feet apart to brace body.

Pet Carrier Folds for Storage

It will give your pet plenty of light and air and yet it occupies a minimum of space when not in use.





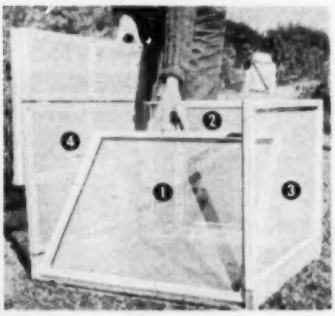
HAULING pets to a vacation spot is always a job whether you go by car or train. You can buy carriers made like suitcases, but this one I built for less than $5 has two distinct advantages over the satchel kind: you can keep your eye on your pet and the cage folds to a package 5" thick.

The secret of the compact folding is in the three base strips nailed to the floor. These strips vary in height. Three sides are hinged to the strips. The other side is hinged to the floor. As the base strips increase in height, the sides decrease by the same amount to match the cage height.

To duplicate this carrier, you'll need:

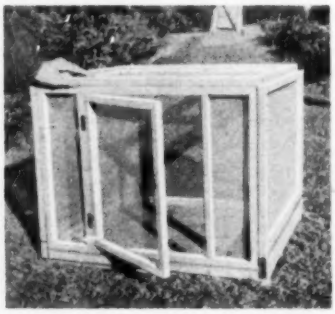
2′ square of ⅛″ hardboard,
about 55′ of ¾″ by ¾″ pine,
2′ of ¾″ by 2¼″ pine,
2′ of ¾″ by 1½″ pine,
8′ of 24″-wide screening,
7 pairs of ½″ by 1½″ butt hinges.

The finished carrier is 18″ by 24″ by 24″. You can vary the proportions, but keep the height 1″ less than the shorter side of the base. Then it will fold correctly.—*John D. Bell, Provincetown, Mass.*

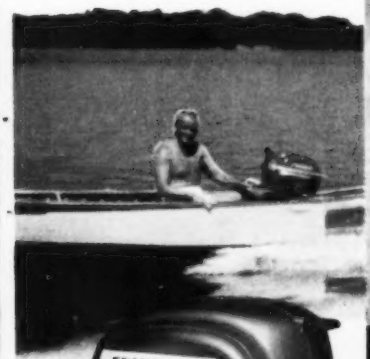


SIDES ARE FOLDED in the numbered sequence shown at left to store the cage. The two-part top and side No. 4 are folded together.

DOOR, in side No. 3, is rabbeted into jamb so it closes flush. Flat hook locks it. Top pegs into holes in side frames and locks with another hook.



choice of the *champs!*



Evie Wolford

EVINRUDE BIG TWIN

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"No sport tests a motor like water skiing. I've tried them all, and Big Twin is the answer on every count. This motor powered me to eight 1952 titles, and Big Twins are used exclusively at the Bruce Parker water skiing schools in Amityville and Nassau. These motors have piled up thousands of hours of top speed towing and delicate maneuvering, with constant gearshifting for pick-ups and take-offs. Big Twin is America's finest outboard motor."

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BIG TWIN, 25 H.P.* Gearshift with neutral, forward, reverse. Cruis-a-Day Tank. Engineered for quick attachment of new Evinrude Simplex Remote Controls. **$390**

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*Power ratings are O.B.C. certified brake H.P. at 4000 R.P.M. Prices F.O.B. factory, subject to change without notice.

Here is Bruce Parker and his trophy-laden troupe at the '52 National meet, American Water Skiing Association, Minocqua, Wisconsin. (From left) Barbara Goode, Eastern Girls' Champion; Bruce Parker, National Senior Champion; Evie Wolford, National Slalom Champion; Jim Myer, Eastern Boys' Champion. In '52 Big Twin powered Bruce to 8 titles. His skiing partner, Evie Wolford, to 8 titles. And both, in doubles events, to 2 titles.

All Play and No Work Built This Barbecue

This ham stonemason finds that an all-weather fireplace troweled up between forms is a pushover—to construct, that is.

By Paul Corey

WE WANTED a barbecue fireplace and it had to be rainproof. That's why we decided to build it in the corner of our cement-floored porch. Come the monsoon season, we would have a roof over our heads. And on sunny days we could eat out on the lawn.

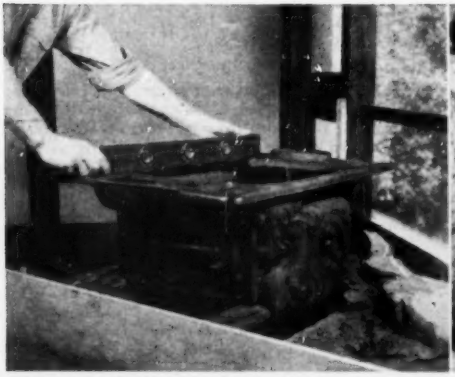
There was only one hitch. I am not a stonemason. I don't know ashlar, either random or coursed, from the broad side of a barn. Neither do I like back-breaking labor. As it turned out, that was all to the good.

Take the barbecue-fireplace footings. I figured that the porch floor was strong enough to bear the weight of a stove, some stones and a pork chop or two. Now I know that I was right. Naturally the footing has to be solid. But barbecue foundations built like icebergs—more rock and concrete under the ground than on top—are a waste of time and effort. A free-standing barbecue doesn't have to resist frost movement like a bridge pier. A slab from 4″ to 6″ in thickness should be sufficient.

Ambitious? Then you can drive 50 miles to find a blacksmith who can weld up a box-and-grill assembly from a set of neatly detailed plans. There are also a number of scientifically designed, prefabricated units

1 CORNER of porch is fireplace location. Isn't the stove a bit too low? Don't bother the man; he's drawing a chalk mark to show him where the base should begin.

2 STOVE out of the way, wood forms are made of 1″ by 8″ sheathing, built up one or two courses at a time. Stones are then plopped in mortar, flat sides facing out.



3 AREA BEHIND STONES is filled with more mortar and rubble, allowed to set and process repeated. At 20″ height the stove is set in place and leveled.

4 TRIANGULAR OPENING is left in masonry to let oven door open. Other stove surfaces are covered with rock wool to provide expansion space for metal when it gets hot.

which may be buried in your own rock pile.

But I picked up a cast-iron cookstove at a junk shop for $5. The old four-lidder had plenty of grill space, a covered area for heating pots and a dandy oven. After I had set it kitty-cornered at the end of the porch (to see how much room it would take), I drew a chalk line across the floor in line with the ash-box lid, and put the stove away until I was ready to set it up for keeps.

Stonemasons in action have always scared me. I wanted no part of their cat's cradle of strings. Instead, I chose the ham's method of using boards to keep my stonework straight and plumb.

For my forms I used one-by-eight sheathing. They didn't have to be heavily braced because I planned to set them up one or two boards high at a time. The system was primitive but it had its advantages. This was going to be a piecemeal job—hours and minutes grabbed after the daily routine. And when I had a weekend to give to the fireplace, I didn't want to spend it matching construction records at McNary Dam. Better to knock off after an hour or two and take a nap or go fishing.

Quarry Rubble Is Cheap

The choice of stone was easy. I bought the cheapest stuff I could get from a local quarry. It cost me $2 a ton, and no self-respecting stonemason would have touched it. But it had good flat surfaces, which are handy when you are using forms.

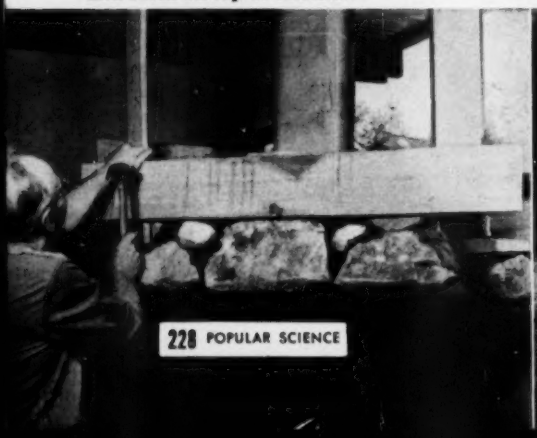
The only stonemason's trick you have to remember is to "break" the joints. In plain English that means to stagger them—after each course is laid you fit the stones of the next one to bridge the joints below.

For me there is only one mortar recipe—

5 FORMING SHELF above triangular opening calls for asbestos-cement-board falsework propped from below. Chicken-wire reinforcement in 2" slab should have been heavier.

6 MORE FORMS are used to build up wings. Vertical board at back slopes slightly forward. An angle-iron bridge to support the flue sheet comes next.

8 FLAT STONES are laid in mortar above the asbestos board and allowed to set. From there to the roof it's smooth sailing—one tile and form on top of another.



9 HOLE through wooden sheathing overhead will be cut just big enough to clear the stone chimney. But hole through aluminum roof a few inches above will just clear central flue.

7 **FALSEWORK** for the flue sheet. The first chimney tile has already been placed on the wings, with three-eighths of its open base resting on the top of the sloping back wall which forms the smoke shelf. A slab of asbestos board is set on the angle iron and propped against the tile. Because of its slope, the sturdy board needs no reinforcing.

10 **ON THE ROOF** care is taken to get a weatherproof seal. Aluminum flashing, mortar, and asphalt roofing cement help keep the rain out. Chimney goes up two more tile courses.

11 **STONEWORK** isn't pretty when forms are removed. But when surplus mortar is chipped away, holes filled and all joints pointed, a stiff brushing cleans things up.

12 POP KNOWS HOW TO COOK, too. And the all-weather spot on the porch is fine; rainy afternoons seem fewer when you have a choice of eating outdoors or under a roof.

the one I learned down on the farm. You use one part of Portland cement to three parts of sharp sand. Masons tell you that for stonework they add another ingredient: one part of lime. This mix is more pliable. It sticks a little better. But it is weaker as a binding medium.

I used a cement-sand mix because I figured my fireplace couldn't be too strong. My wood-form method called for a lot of "mud." An expert could have saved more than half of the cement I used by troweling up his exposed-face walls with mortar. But what I lost in volume I saved in time.

Because I had stripped my stove of legs, I had to puddle a good bit of mortar before I could set the old four-lidder in place. After wetting the concrete floor of the porch, I spread my mix right up to the line of the bottom form boards, then plopped the first of the stones into it flat side out along each edge of the triangular base. After buttering up their inside surfaces, the triangle was ready to be filled with small rocks and mortar. That done, I let it set, nailed up another triangle of boards and repeated the process. This put the slab just 20″ above the floor—the right height for my stove.

Some prefabricated barbecue units are meant to be removable. In that case the stone- or brickwork doesn't fit snugly. Which is all to the good, because heated metal expands. If you lock the unit firmly in the masonry you won't hurt the metal. But at every barbecue it will suddenly bow in with a startling thump. This causes your guests to choke on their olives and drop their coffee cups.

Don't Frighten Your Guests

I knew that the cast iron in my stove would be more stable than sheet metal. But out of consideration for frayed nerves I dabbed big wads of rock wool into wet mortar and pressed them into a blanket around three sides of the stove before filling in with solid masonry. This left an expansion chamber between them.

The oven door presented a minor problem. It was on the side, not the front. I wanted it to open, so I left a triangular gap in the stonework on that side.

The gap above it had to be bridged. I scoured around for a sheet of asbestos-cement board. Cut in the form of a triangle and supported between the top of a course of mortar and decorative ridges above the oven door, it could be left in place after it had served as a falsework.

For additional support I backed up the front edge of the asbestos board with a temporary 2″ by 4″ block and used a triangle of 1″ chicken wire to reinforce the 2″ layer of mortar that I poured on top of it. (Heavier reinforcing wire would be smarter, though it hasn't cracked yet.) This slab not only makes a roof for the stove-door opening; it gives me a place to put the stove lids when I am cooking over an open fire.

Smoke Shelf and Chimney Not Too Tough

Next came the two wings which continued upward from the stove top. Their inside surfaces were floated against wooden forms. At the back I left a passageway for smoke to rise from the flue opening in the stove, using an up-ended form board that sloped slightly forward at the top.

Twenty inches above the stove and 16″ out from the sloping board I placed an angle iron across the shelves. Two more wing forms and I was ready to set up the

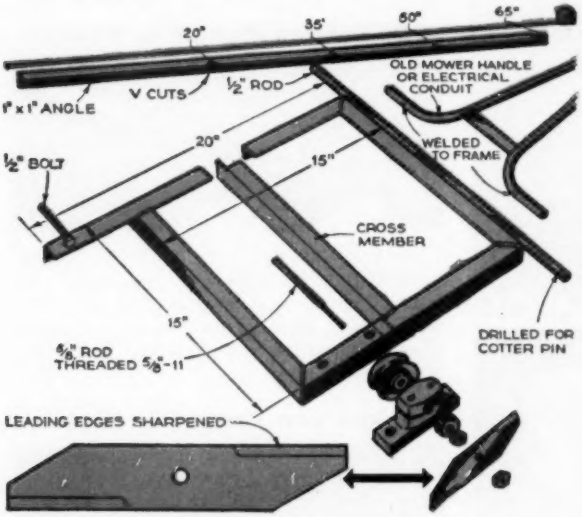
[*Continued on page 244*]

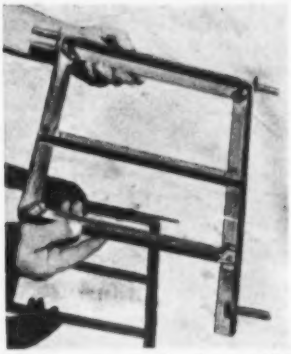
Power Edger Sharpens Up Your Lawn's Looks

Trimming neat margins along driveways and walks is a painless job with this motorized cutter.

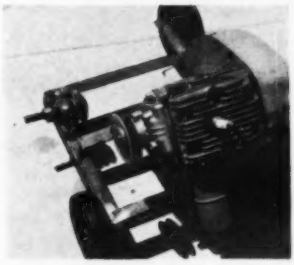
A LIGHT once-over around the edges is a cinch with this power edger built by Ed Meese of Culver City, Calif. The spinning blade, cut from a short piece of truck spring, trims overhanging grass and slices the turf to a depth of 2½", leaving a crisp edge on the lawn.

Construction is just a matter of bending up the angle-iron frame and welding it together. The 1½-hp. gas engine has a built-in reduction gear, necessitating a slight step-up ratio of the V-belt pulleys. A one-to-one ratio is suitable for plain, shaft-output engines. The engine is started with the edger tilted back to raise the knife clear of the ground. It is then lowered and guided along the lawn edge by a mark painted on the fender. Although the wheels are not powered, the counterclockwise rotation of the blade helps the machine along.



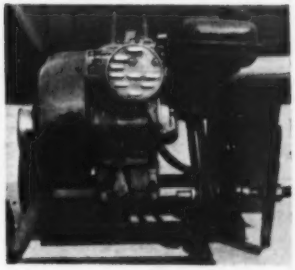


FRAME was made from 65" length of 1" by 1" angle iron. V cuts were made as shown and angle bent to form frame. Cold-rolled rod and ½" bolt made axles for the three wheels. Cost of edger was $5.25 exclusive of engine.

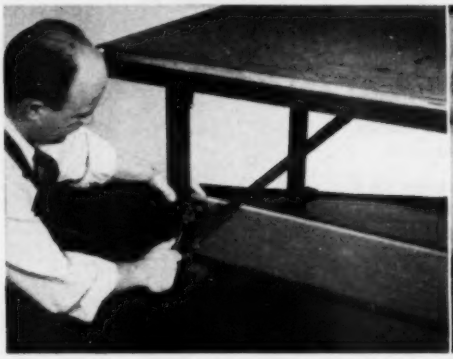


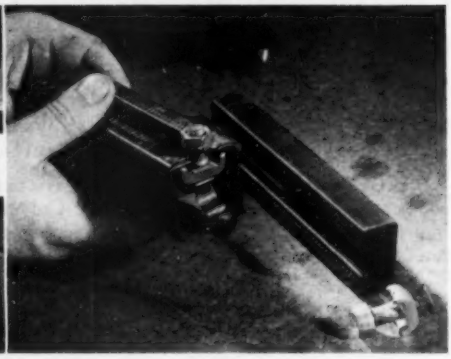
PILLOW-BLOCK BEARING bolted to frame (left) supports knife shaft. Engine's weight is behind diagonal line from front to left rear wheel.

KNIFE is piece of truck spring long enough to cut 2½" into turf. Leading edges are ground to a V. Sheet-metal fender protects operator from flying pebbles.



New Framing Material Easily Assembled into Bench or Racks





ORIGINALLY designed to make industrial racks and scaffolding, a steel framing material called Mult-A-Frame is now sold in small quantities for building workbenches, power-tool stands and lumber racks in the home workshop.

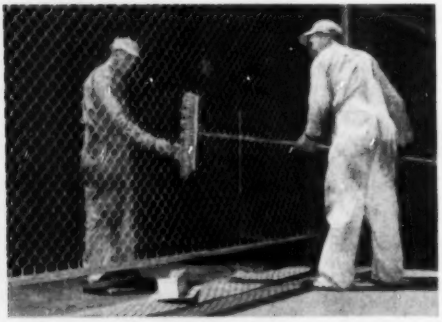
With the three basic assembly units—channel, spring T Bolt and angle fittings—any type of framework can be constructed with only a hacksaw and a wrench. All parts are keyed to prevent slippage or sidesway.

Ainsworth Mfg. Corp., 2200 Franklin St., Detroit, is the maker.

Weed Cutter Made from Hoe

You can quickly make one of those just-under-the-surface weed cutters by heating the tang of an ordinary garden hoe and bending it.—*Clinton R. Hull, Costa Mesa, Calif.*

Brush Broom Paints Wire Fence

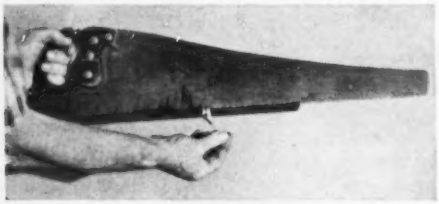


ONLY a minimum of paint and effort is needed to paint a wire fence this way. One man uses a brush broom to spread the paint. A helper, on the other side of the fence, uses a wall brush to smooth out the excess. Workmen at the American Viscose Corp. plant in Roanoke, Va., developed the method.

CO_2 Bottles Make File Handles

EMPTY carbon dioxide bottles—like those used to put the sparkle in homemade carbonated water—can be converted into good file handles. Drill out most of the soft-metal plug in the neck and then tap the bottle onto the file tang.

Smoked Saw Teeth File Faster



SAWS can be sharpened more quickly if you will first smoke the teeth with the flame of a match or candle. Then it is easy to see which teeth have been filed. This is especially true when your working light is not too good or when the job is likely to be interrupted frequently.

Light Boat Trailer Uses Bike Parts

Balloon tires, two front forks and some aluminum channel give you a trailer that takes a small boat right to the water.

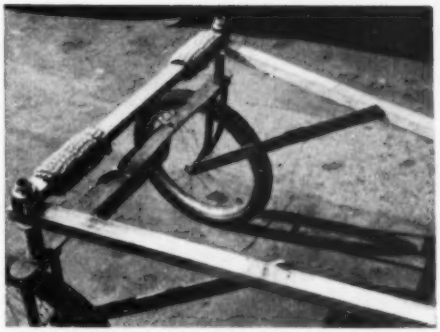
PILOTING a sailing surfboard is my dish—and getting mine down to the beach was no problem when I drove a standard sedan; I just lashed it up on the ski rack. When I switched to a convertible I found I'd have to have a trailer, or no more sailing.

The rig shown here now takes me down to the sea with my surfboard. Though it is light in weight, its construction is sturdy and I'm sure it'll haul anything that can be carried on top of a sedan.

I built the whole thing around two bicycle forks and a pair of 20″ wheels. The forks were welded to a 3′ strip of iron ¼″ thick by 2″ wide. Two more 1½″-wide strips served as side braces and a triangle cut from ¼″ plate attached the frame to the trailer hitch.

The frame itself was built of light, strong aluminum channel and weighs so little that when I get to the beach, I detach the trailer hitch and rickshaw the whole works right down to the water's edge—a one-man job I couldn't accomplish with my old car-top rig.—*Daniel R. Rubin, Woodside, N. Y.*

BICYCLE FORKS, the flat-topped type, were welded to a ¼″-thick iron strap, taking care to get the wheels parallel. A pair of stiff coil springs take up road shocks. Note rubber washers under and over spring, and between channel at corner joint.



ALUMINUM CHANNEL, 1¼″ by 1½″, makes light, sturdy frame. Sides are 8′ lengths, rear cross member is 3′. Nuts, bought at bike shop, hold forks in place and join channel sections. Two ¼″ by 1½″ side braces, 30″ long, run from axle to frame to hold forks vertical.

TRAILER HITCH was fastened to frame by ¼″ steel gusset. Gusset also joins meeting ends of frame. Eyebolts at each side simplify lashing boat.

HEAVY CARPETING and rubber matting cushion boat and protect it from scratches. Stoplight was added before first trip to conform with state regulations. It comes in kit form, complete with wiring and plug.

Stretch Your Paint Dollars on a Rubber Base

Washable, easy to use and noninflammable, rubber-base paints are the weekend painter's friends.

By Stephen L. Wolf

MOST people find the preparation and cleanup of a home painting job more work than the actual painting. If that's your problem, you may find rubber-base paint the answer. You can apply this interior finish with no more cleanup than washing your brush with soap and water. And it offers three major advantages:

- It is easier to apply than oil-base paints—and a lot less bother to handle.
- It is water-thinned, which makes it thrifty to use and avoids fire risks.
- It is thoroughly washable, even scrubbable—which is where you stretch your paint dollars.

While water-thinned, these paints use an emulsion of synthetic-rubber latex to carry pigment. Don't confuse them with earlier water-thinned resin emulsions, which were not too durable. The new paint is an entirely different and better product.

But it has its limitations—you must know where and how to use it. Don't try to wash rubber-emulsion paint for at least a month. Though it dries to the touch after an hour or two, the film continues to harden for many days.

Once cured, however, the paint becomes not only washable but waterproof. Contrary to popular opinion, this makes it unsuitable for walls that show any trace of dampness. The moisture cannot escape through the paint pores so it pushes the whole film off the surface.

You can use a rubber-base paint in the bathroom or kitchen—even on kitchen cabinets—in place of enamel. But keep in mind that if the surface is wet before it is thoroughly hardened, it may be damaged. In general, you will be safer with traditional enamel for these rooms.

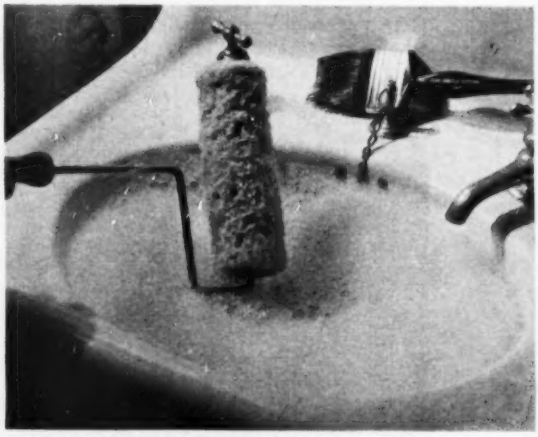
Good surface preparation is vital, of course. Here's how you prepare for a rubber finish:

Over flat oil paints. The surface should be clean and free from scaling paint. One coat is usually enough.

Over flat water paints. If you suspect that the old surface is a water paint, test a small area with a wet cloth. If the paint rubs up, it must be cleaned off before you repaint.

Over enamels. Rubber-base paint will not grip a glossy surface. Sand lightly or wash with a strong cleanser.

Over bare plaster. If the plaster is more than a month old, cover first with a standard oil-base primer. But if the plaster is so new that there is danger of lime burning through, prime with the rubber paint itself, which is limeproof. Just be sure the

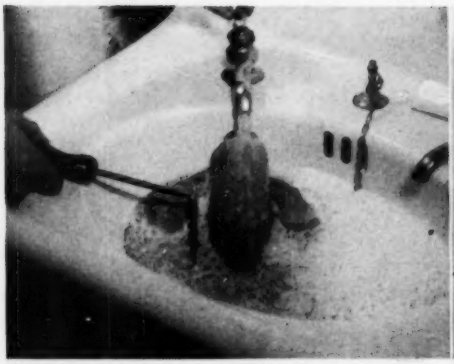


WASH BOTH BRUSH AND ROLLER first in soapy water and leave the soap in: it helps paint go on, simplifies brush cleaning later. A short-nap roller is better than lamb's wool.

RUBBER-BASE PAINT GOES ON so easily that even the small fry will want to take a hand. As has been done in center above, prime all fresh plaster patches first with the rubber-base itself, which is lime-resistant. Don't use shellac—it might show through later.

YOU CAN THIN rubber-emulsion paint by adding a little water, but generally this is not necessary. Some kinds come as a paste that must be mixed with water.

ROLL PAINT ON so surface is liberally covered. Rough wooden basement partition here was coated by old layer of paint, otherwise would need primer to keep grain down.



JUST WASH OUT ROLLER or brush in soap and water after you're through. Even the can can be wiped clean. Be sure to leave brush in water if you stop for even a short break.

DIRTY HAND MARKS are easily washed off a rubber-base surface—after 30 days. Wetting before that may damage surface. Once cured, surface is highly abrasion-resistant.

plaster is dry before you start to paint.

Over dry-wall construction. Rubber-emulsion paint is an excellent primer for wallboard and plasterboard. Two coats of it will give a finished job.

Over bare metal. Here, too, prime first, this time with a good metal primer. Emulsion paint doesn't stick well to bare metal and may actually promote rusting.

Over wallpaper. It is always wisest not to paint over wallpaper—but if you must, test a section first to be sure the ink will not bleed through the paint. Remember that if you decide later to remove the paper the waterproof rubber finish will shield the wallpaper paste from all attempts to soften it for removal.

How to use. In its regular form, rubber-emulsion paint has slightly more sheen than oil-base flat. There is also a new semi-gloss type just coming on the market. Both come in a pretty full range of colors, including deep tones but no really bright ones. If you wish to do your own tinting, mix the paint only with rubber-base paint of the same brand, or with casein colors. Do not use colors in oil.

When two coats are required, give the first one at least 12 hours to dry. Otherwise the second coat may pick up the first. Dryness to touch is not an adequate test. Missed spots or holidays in the work may be touched up only after the film has dried. Otherwise, you'll have lap marks and noticeable variations in sheen.

And don't be discouraged if the wall is mottled a dozen different shades as the paint dries. It takes several hours for the final uniform finish to appear. It also darkens considerably while drying.

Brush, roll or spray. You can apply rubber-base paint equally well with a brush, roller or spray gun. If you use a brush, put the paint on in short strokes. It will spread easily. If you use a roller, you'll find the dip type easier to handle. The kind you fill must be completely cleaned each time you lay it aside, since immersing it in water to keep the surface paint soft will thin the paint inside the barrel.

If you spray, be sure your equipment is clean, with no trace of turpentine, benzine or lacquer thinner. Thin the rubber paint with water according to the spray pressure. Above all, wash out your machine directly after use. Should the paint dry in the hose and nozzle it will prove almost impossible to remove.

Wipe off spatters immediately while the paint is fresh—once it's set only sanding will take it off. The rubber base can, however, be painted or papered over.

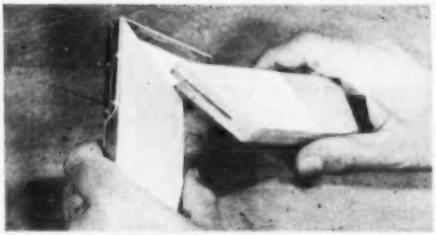
Right now a formidable competitor to the rubber-base paints is entering the field—the alkyd-resin flat paints. These are oil paints that offer the same advantage in washability as rubber-base emulsions. They do not require the long curing period, but they are inflammable. END

'53 Cars Are Brightest

NEW cars for 1953 carry as standard equipment an average of more than 30 light bulbs, say Westinghouse lamp engineers. They range in size from the dashboard's tiny 1.8-watt indicator lamp to 45-watt upper-beam headlights.

1. New Hardboard Can Bend. You can make a circle almost as tight as a hatband with a narrow strip of this hardboard. Except for its bending characteristics, the material has the properties of regular hardboard. It can be worked with ordinary tools, nailed, screwed or glued, and painted. Manufactured in thicknesses of ⅛", 3/16" and ¼", it sells at the price of standard hardboard.

2. Circuit Breaker Fits Home Boxes. A new miniature circuit breaker goes into the same socket that takes an ordinary fuse, permitting easy change-over to circuit-breaker protection. Since breakers do not burn out when a short circuit occurs – instead, they simply open like a switch–they last indefinitely. Power is restored simply by pushing a button to close the circuit. Mini-Breakers come in 15-, 20- and 30-amp. sizes, cost $1.50.



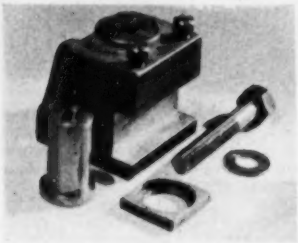
3. Corner Brace Has Tongue. This brace has a central tongue or spline that fits a slot sawed in a miter joint. Four nails in each leg then secure the brace to the wooden parts. The brace, made of aluminum alloy, is handy for strengthening the corners of screens, storm windows and furniture.

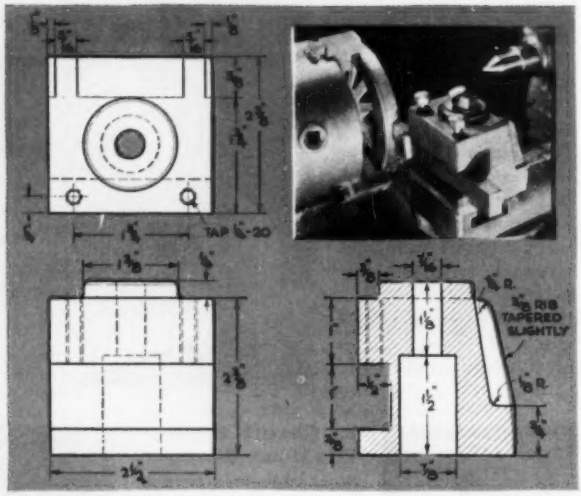
4. Liquid Keeps Paint Fresh. Preventing the formation of skin in partly used cans of paint is the job of this new chemical. If you stir in a little Paint-Sav–half an ounce for each quart of paint or varnish–before putting the can back on the shelf, the paint will stay ready for use for months, the manufacturer reports.

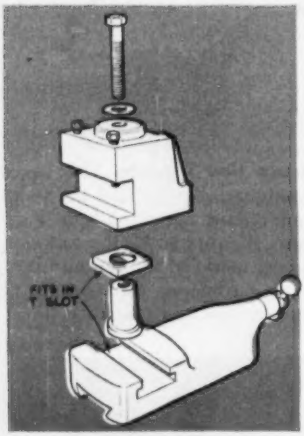
5. Coating Protects Metal. Brushed or wiped on with a cloth, this liquid helps protect metals from corrosion, tarnishing and rusting. It hardens to a colorless coating that is said to resist rain, salt, grease and many solvents. The liquid can be used indoors or out on aluminum sashes and doors, auto bumpers, brass doorknobs and tools.

Further information on these products can be obtained from: 1. Anacortes Veneer, Inc., Anacortes, Wash.; 2. Mechanical Products, Inc., 1824 River St., Jackson, Mich.; 3. Reagan Products Co., 35 Beacon St., Natick, Mass.; 4. The Ames Laboratories, Inc., 132 Water St., So. Norwalk, Conn.; 5. Alumi-gard Co., 1638 W. 79th St., Chicago 20.

NEW Shop Ideas







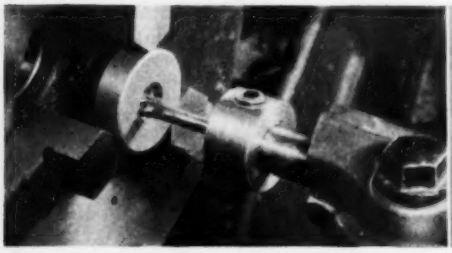
Open-Side Tool Holder. If you use cemented carbide cutting tools, an open-side holder gives the firm support needed, and is convenient for working close to the chuck or faceplate. Make a wood pattern, send it to a local foundry to be cast in nickel iron and finish off the necessary machining on your lathe.

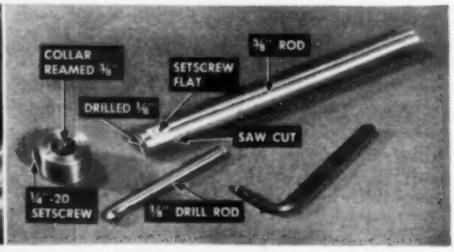
The first machining step is to smooth the bottom and the side groove, using the milling attachment and an end mill. The casting is then clamped in the four-jaw chuck for facing off the top and drilling the hole for the lock bolt. It is reversed in the chuck and bored for the clamping post. Finally, the two holes for the hardened setscrews are drilled and tapped.

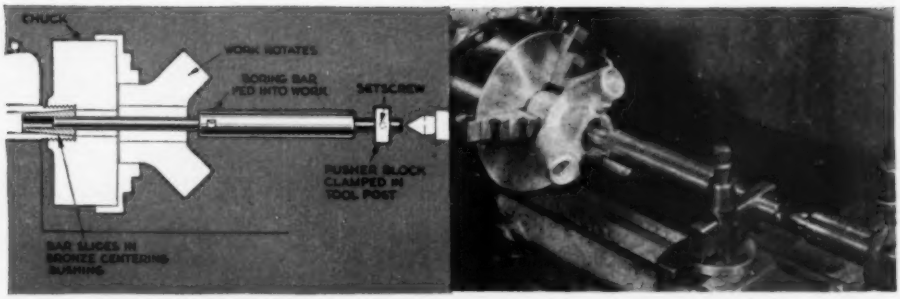
The clamp post is turned from 1⅛" cold-rolled rod. The square washer that fits over it to engage the T/slot in the lathe compound is bored and recessed in the four-jaw chuck. The height of the cutting tool can be varied by shimming it with strips of flat steel.

Bar Bores Small Holes. Holding a slender boring bit close and securely enough to eliminate chatter and squeal presents no problem to this two-piece holder designed to fit in the regular boring-bar holder.

In use, the boring bit is inserted into the slotted ⅛" hole and clamped in position by the setscrew and collar. This assembly is then set up in the regular boring-bar holder and adjusted parallel to the lathe center, and to the proper height. The bit can be removed for regrinding without disturbing the alignment of the holder.—*Ray Millholland, Indianapolis.*







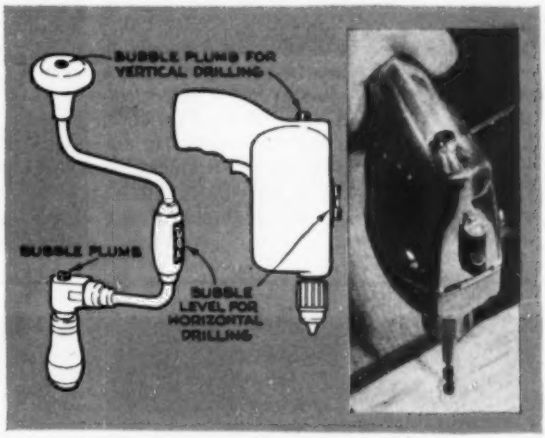
Setup for Accurate Holes. Deep bores, such as that being made in the tripod casting above, can be accurately cut in work mounted in the three- or four-jaw chuck.

A bronze bushing tapered to fit the headstock spindle and bored to fit the shouldered head end of the boring bar is inserted in the headstock behind the chuck. The tail end of the boring bar, also shouldered, is held by a steel pusher block clamped in the tool post.

In use, the work is centered in the chuck, the head end of the bar inserted in the centering bushing, and the tail end supported by the tailstock center. The carriage and tool-post pusher block are adjusted to secure the bar without disturbing its position, and the lathe set in motion. The bar is fed into the rotating work by moving the carriage toward the headstock. As the bar advances, it will leave the tailstock center, but if the pusher block has been adjusted properly, the cut will continue to be true. *—Floyd McGuckin, Ridgewood, N. J.*

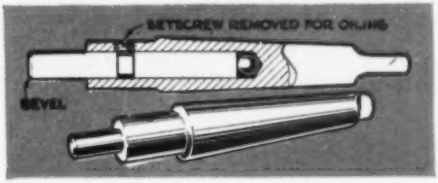
Levels Guide Drill. Fit your electric drill, hand drill or bit brace with a set of bubble levels and you'll *know* the hole you're drilling is true.

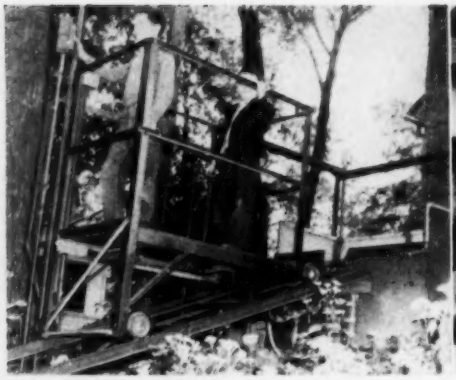
A circular bubble plumb mounted at the back of the drill will indicate a true vertical, while a plane or surface level mounted parallel with the drill bit will insure the horizontal position. Setting of levels should be checked before relying on them completely.—*A. Pfeiffer, Old Lyme, Conn.*



Tailstock Stop Measures Cutoffs. With the cutoff tool set at the desired distance from this tailstock stop, duplicate short lengths can be cut from stock fed through the headstock spindle of the lathe.

The body of the tool was made from the tapered shank of a discarded twist drill. It was set in the headstock spindle, drilled and reamed ⅜″ for the revolving stop pin. The pin was made from a short length of ⅜″ drill rod faced on both ends and beveled slightly at the outer end to bear against the work. A 5/16″ ball bearing was inserted in the bored hole to back up the stop pin. The shouldered setscrew-and-groove locking arrangement keeps the pin from dropping out when not in use, and has nothing to do with backing it up.—*C. W. Woodson.*





PUSH-BUTTON OPERATION. Closing a two-way circuit like the one that controls lights from either end of a staircase sets the cage in motion. Limit switches stop the elevator automatically at both ends of the hoist.

THE FREE-SWINGING SAFETY HOOK under the cage has never been needed, but would drop over cross braces the moment the cable broke. The clevis that connects the cable to the hook can be seen above hand.

Inclined Outdoor Elevator Lifts You to Hilltop House

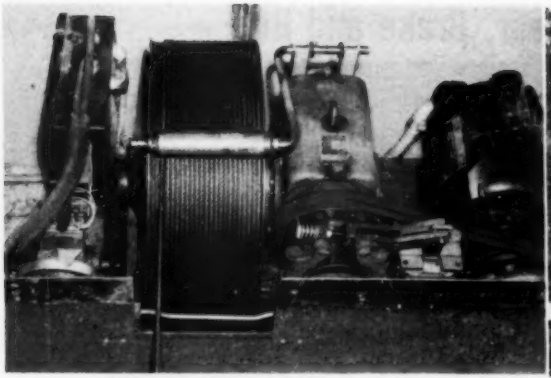
WHEN scrambling up the vicious slope from the boathouse to his home got too much for Zig Rudolph of Big Cedar Lake, Wis., he decided he needed a cable railway of his own. And when he discovered an enticing supply of war-surplus winches, reducers and controls at a Milwaukee store, he knew he was on the right trail. He enlisted the help of Otto Henke, engineer for the C & H Co., who is another confirmed gadgeteer, and built the slick job shown above and at right.

Completely automatic and studded with safety devices, the outfit lifts three or four adults up the slope quickly and smoothly. You simply punch a button to start it; limit switches bring the platform to a stop flush with the loading ramp at either end. The hoist holds the platform wherever it is if the current should fail, and an ingenious hook locks it immediately if the cable should break. Rudolph's railway has earned another use; the kids say it's a wonderful ski tow in the wintertime.

Inclined Dock Rolls Down Track to Suit Changing River Level

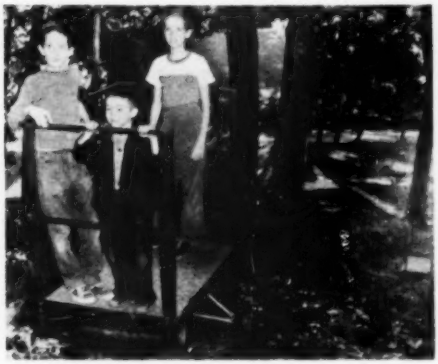
BECAUSE the Mississippi River and its tributaries have their ups and downs, Frank W. Meyer of East St. Louis, Ill., uses a hand-operated variation of the Rudolph cable railway above to provide an adjustable boat landing. It is also a handy passenger hoist and, with a bit of camouflage, serves as a duck blind. An old Mack-truck steering assembly, 7-to-1 gear ratio, turns the two cable drums that raise and lower the platform on mine rails anchored to a cedar ramp. A locking device on the wheel column holds the cage at any point along the 45° track.

HARDWOOD LUMBER and 6′ gauge were used for strength; open construction minimizes flood damage. Iron wheels, flanged with wooden disks, roll on discarded mine rails.



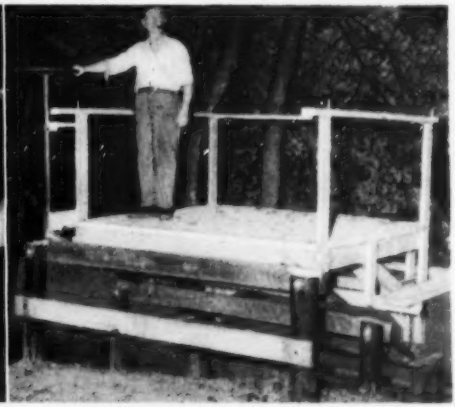
POWER PLANT in weatherproof box consists of a ½-hp. electric motor, connected to the speed reducer on a war-surplus power winch. Magnetic brake on the reducer shaft locks the winch when current is off.

RAILED TERMINAL PLATFORMS are another safety feature. Inclined track is held to gauge by cross braces welded between the mine-rail tracks.



PROTECTED ON THREE SIDES by railings of aluminum angle stock, these youngsters ride the incline elevator for fun. But its real purpose is to tote supplies between a boathouse and a hillside home.

SEVEN-TO-ONE GEARBOX turns the drums that pay out hoisting cables. Chain and lock discourages trespassers.



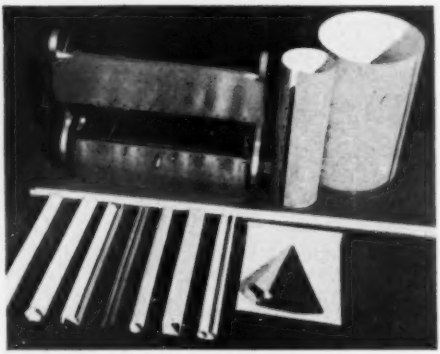
SPINNING THE WHEEL is easier than scrambling down the riverbank. The dock can be locked at any level.

Machine Is Sheet-Metal Shear, Brake and Roll

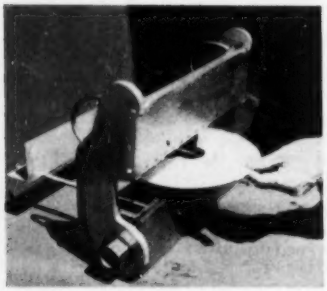
BESIDES cutting sheet metal up to 22 gauge, this machine will take dies to roll tubes from ⅜″ and cylinders up to several inches in diameter. It can also form beads, cones and polygons, and even bend up a dodecahedron (12-sided figure) from a single piece of stock.

Invented by John M. Minor of Walteria, Calif., the tool weighs 40 lb. and is 14″ long. An adjustable stop controls the stroke of the die and thus the degree of bend produced. Shapes up to 1½″ in cross section can be made in any length by extending the worked part past the machine.

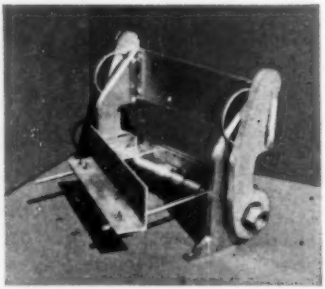
Dies can be changed in a few minutes. A 20″ hand lever exerts more than 10,000-lb. pressure on the work through a cam action. The photos show one of the inventor's models, but the machine is not yet on the market.

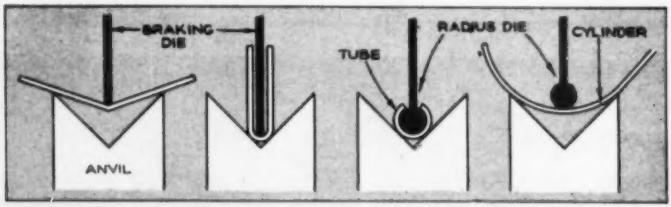


BIG CYLINDERS, small tubes and all sorts of shapes including the nine numerals can be made. The machine can shape model-railroad track and scale-size corrugated iron. Hex cone in foreground above was shaped inside a flat sheet with sectional braking die.

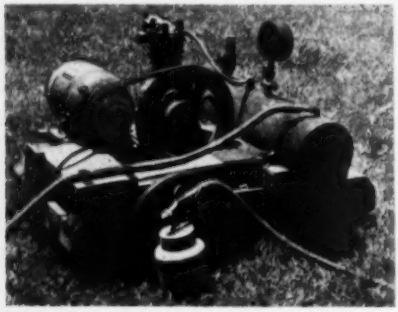


SECTIONAL DIES can shape part of a sheet while leaving the rest untouched, as in braking the seam of a funnel (left). Dies of various lengths are clamped in the jaw as required to a total length of 14″. Rear view shows adjustable stop and angle gauge.





HOW IT WORKS. Braking die makes anything from a shallow bend to 180° fold, depending on the depth of its stroke. Radius dies of various sizes form tubes or, in small "bites," roll cylinders to shape.



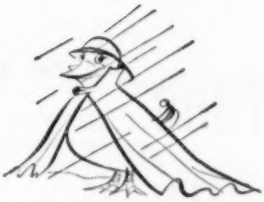
Old Refrigerator Unit Sprays Paint

A SECOND-HAND refrigerator compressor powers my spray gun. For a tank, I use a 16″ length of 8″ pipe with ends welded into it, which safely holds the 40-lb. working pressure. I had several ⅜″ and ½″ nipples welded into the tank to take a pressure-relief valve, a pressure gauge and a hose connection to the spray gun.

A small basket of window screening is bolted over the intake to keep out dirt. The outfit is mounted on a wheeled wooden frame.—*Roland Loewen, Anniston, Ala.*

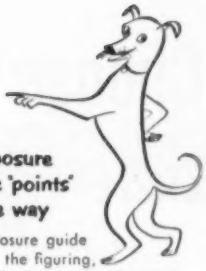
A little film goes a long way

Uses economical 8mm. roll film with easy, no-thread loading. Enough film in each roll to shoot 30-40 average-length movie scenes!



Movies rain or shine

Your choice of an f/2.7 lens . . . plenty fast enough for cloudy-day shooting . . . or a super-speedy f/1.9 job that can see in the rain. Both Lumenized (hard-coated), of course.



Exposure guide 'points' the way

Built-in exposure guide takes out all the figuring, leaves only the fun . . . makes sure exposure's on the button every time!

It's the sportsman's movie camera

CINE-KODAK RELIANT CAMERA

With f/2.7 lens, $82.30

With super-speedy f/1.9 lens, $102.25

Prices include Federal Tax and are subject to change without notice.

Telephoto for long reach

It's an accessory 3x to let you come up close on those hard-to-reach shots. View finder shows fields for standard or telephoto lens.

Tough . . . rugged

Die-cast aluminum body is built to take it. Your "Reliant" thrives on rough going – yet it's sweet-running as a custom-made reel.

Color movies, of course

Gets wonderful full-color movies as easily as black-and-white. Inexpensive, too, Kodachrome movie film costs only $3.95 a roll . . . complete . . . ready to show!

Slow motion, too

Really cuts fast action down to size. Use it with any film, either lens, for those extra-detailed effects.

Slips in a pocket

Light and compact enough to slip in a jacket pocket where it's always ready when action starts popping. Swings and points as easily as your own 12-gauge.

See "Photographic Equipment and Supplies"

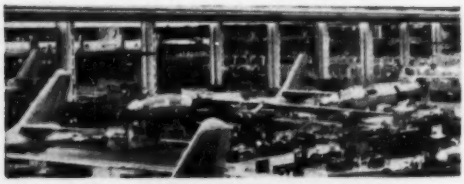
See the "Reliant" at your Kodak dealer's

He'll be happy to help you choose the model that's right for you, the f/2.7 or the f/1.9. Either way you're getting "tops" in movie-making enjoyment. Other Kodak movie cameras from $42.50.

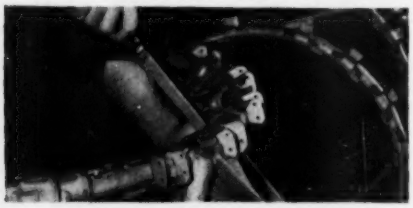
Eastman Kodak Company, Rochester 4, N.Y.

Kodak

Choose the files that industry uses



(Above) B-47 jet bombers being assembled at the Boeing Airplane Company's Wichita plant. (Below) Filing operation on an aluminum-alloy structural part for a Boeing plane in Seattle plant.



It's a safe bet that industrial production heads, tool specialists and efficiency experts carefully consider the effectiveness, working speed and lasting qualities of the files they select.

On that basis it is understandable why American industry uses far more Nicholson and Black Diamond files than any other two brands in the world.

It also constitutes good reasons why skilled home craftsmen and professional mechanics usually select them for their personal use. You can get them from most any industrial distributor or up-to-date hardware store.

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BLACK DIAMOND TRADE MARK

NICHOLSON FILES *FOR EVERY PURPOSE*

All Play and No Work Built Barbecue

[*Continued from page 230*]

first flue tile. I rested it on the vertical form board, with a 3″ by 8″ section of the opening behind it and the rest of the 8″ by 8″ flue out front. The rear area would form a smoke shelf, to stop chimney downdrafts.

Now I needed a sloping section of masonry to connect the angle iron with the forward edge of the flue. Another piece of asbestos-cement board formed the falsework for this hood. I cemented flat stones right over it to the point where the chimney began.

That chimney was a cinch—right to within one course of the ceiling. Through the roof I cut a hole that would allow not only the flue, but 8″ of stone facing on all sides to squeeze through it. Through the aluminum sheeting above the wood the square hole was smaller, just 1″ larger than the tile.

Next I fed mortar down through the hole from above, faced it with loose stone from below, and returned to the roof to embed the aluminum flashing in a few more scoopfuls of mix. With a layer of asphalt roof cement on top of that I was ready to finish off the chimney.

Don't Be Discouraged

When I took down the forms and looked at my handiwork, I wished I had never started the project. It looked about as artistic as a piece of peanut brittle. But I didn't give up. With a hammer and chisel I chipped the loose mortar from between the stones. Then I pointed up the gaps with a mixture of one part of cement and one of plaster sand, and brushed the partly dry surface. Then the job was really handsome.

Of course there were things I had forgotten. Pegs in the wall for barbecue tools, for example. Fortunately I had a carbide-tipped masonry bit. The pegs are now in place.

Someday I may have a blacksmith weld a grill, just to fit on top of the stove. But right now I find that expanded metal lath does very well. It's inexpensive and it gives a beautiful, diamond-shaped pattern to the humblest hot dog or hamburger. END

A Woman's Support

MARRIAGE entitles a woman to the protection of a strong man who steadies the stepladder for her while she paints the kitchen ceiling.—*Lino-Lines.*

Spark Plugs that Perform **LIKE THIS** —

100.31 M.P.H. FOR 7 DAYS AND 7 NIGHTS

Will Make **YOUR CAR** Perform Better!

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The Champion Spark Plugs used in this record-smashing endurance run are identical—in materials, design and workmanship—to the Champions available for your car. More overpowering evidence that Champions can give you the best performance and dependability of which your car is capable! So try a set of Champions today! You will never again be satisfied with ordinary spark plugs.

CHAMPION SPARK PLUG COMPANY, TOLEDO 1, OHIO

Better by Far for **EVERY CAR** *Regardless of Make or Year*

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"For years, car manufacturers have tried to build a car with *all* the grace and beauty of a designer's sketch *plus* the ruggedness, the solidness and weather-tightness demanded by engineers. This perfect blending of quality and beauty has been achieved by Ford. And when you Test Drive this '53 Ford, you can actually *feel* the superior craftsmanship of its Crestmark Body."

"First look for seams. At places where you'd expect to feel seams (where fenders join body, etc.) there are *no* seams. The joints which join the body's top, sides and bottom are welded to form *one* solid unit. This eliminates seams which could hold moisture and form rust."

"Next, inspect the finish. It's a beautiful baked enamel finish—baked right over a complete rust-proofing treatment. It's a sparkling, smooth paint job that not only *looks* good and *feels* good, but one that's hard and durable . . . built to live outdoors."

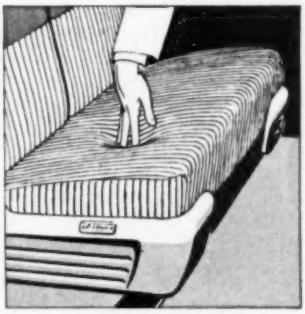
"Now open the door. The door corners are curved. This permits the use of a continuous band of rubber weather-stripping, for a tighter fit. Ford's push-button rotary door latches are the most modern design . . . let doors open easily . . . stay closed safely."

Worth more when you buy it . . . Worth more when you sell it!

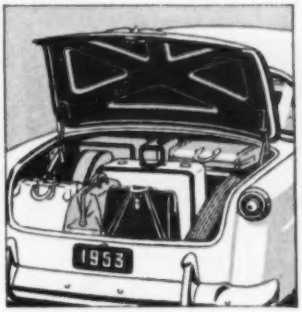
'53 Ford

the quality body" *says Dr. Roy K. Marshall*

"Ford's one-piece windshield is smoothly curved in one solid piece to give you unobstructed, undistorted visibility. The same is true of the car-wide rear window. And the side windows are big picture windows which let in all the scenery."



"Feel that Ford upholstery! It's as fine as a living-room sofa's (and designed to last for years!) All seats are soft, yet firm, for Ford uses foam rubber cushions over non-sag springs, both front and rear . . . just like America's highest-priced cars."



"Take trunk space. With a big, roomy trunk to start with . . . Ford's counterbalancing Space Saver hinges and short fill pipe allow room for at least one suitcase more. And like Ford's Crestmark Body it is hull-tight to seal out dust and weather."

One of Ford's 41 "Worth More" features

. . . the Ford Crestmark Body is a big reason why Ford is considered the New Standard of the American Road.

See it . . .
Value Check it . . .
Test Drive it!

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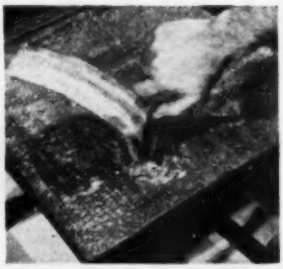
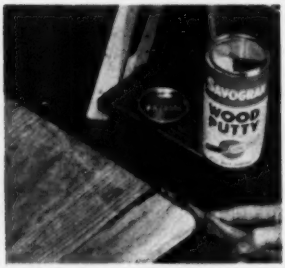
How to Get Smoother, Slicker Paint Jobs



Step 1. *Prepare surface.* Remove all chipped and peeling paint or varnish down to bare wood. You can do this easily and quickly with Strypeeze . . . the *guaranteed* paint remover that stays wet longer, clings to upright surfaces, doesn't harm hands.



Step 2. *Rebuild broken corners, fill nicks and holes.* A powder-form plastic putty, Savogran Wood Putty, is ideal for this. You can form it, tool it . . . and it doesn't shrink. For cracks in plaster, use Savogran Crack Filler. It's the original patented quick-hardening water putty.

Step 3. *Start job with clean brushes.* If it's an old brush, clean it before you begin painting. Clean all brushes after painting and whenever you change colors. Kwikeeze, the Liquid Brush Cleaner, softens *hard* brushes in minutes . . . cleans out fresh paint instantly! May be reused.

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Gus Finds a Golden Thread

[*Continued from page 196*]

Gus frowned. "New points and new distributor. Checked and rechecked them. Went over the electrical system from A to Izzard. It's as good as new, and most of the parts *are* new. Even a new condenser. No wonder Mrs. Baumann's husband didn't want to put any more money into it."

Stan coughed sympathetically.

Why Mechanics Grow Gray

"Not a gauge in the shop shows a single thing. Battery good, cables clean. Coil new, and tests that way. No shorts, no poor contacts. The ignition switch is all right. This pile of trouble is just as good, electrically, as the day it came out of the factory."

"And I suppose the gas is all right, too?"

"Fuel? All lines are clear, Stan. The fuel pump is a rebuilt exchange pump, but it's all right. And don't mention vapor lock."

Stan blinked. "It's running, isn't it? Maybe you fixed it."

"Yes, it's running . . . now."

The motor stopped dead.

"Kill the ignition," Gus said shortly. "Let's see what a cup of coffee will do."

The coffee warm inside him, Gus felt a little better when he came back to the sedan. He lifted the hood and glared at the motor. He used his fingers to work the starter and the motor ran without complaint. Stan came over carrying fresh wiping cloths and an air of sympathy.

"Any luck yet, Gus?"

Gus wagged his head and absently eyed the distributor. "No luck."

And the motor stopped again.

Gus Has the Situation in Hand

For a long moment Gus remained motionless. Then his hand shot downward, like a striking snake, and back out again. He looked closely at what he had in his palm. Then he poked his arm into the engine compartment. The starter ground, and the engine caught. Gus straightened and dropped the hood with a clang of finality.

"Stan, will you run out and pick up Mrs. Baumann? And you can give her a message for me when you get there."

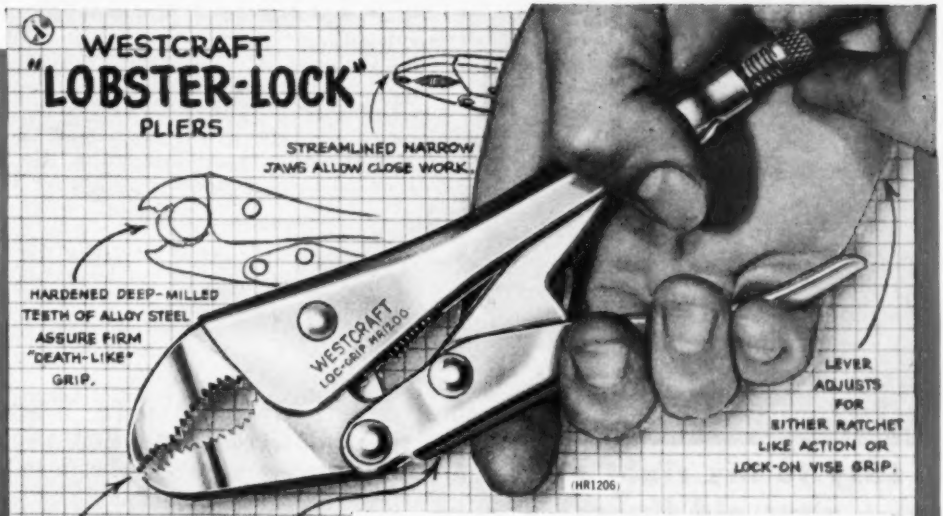
"What's the message?"

"Just say her car is fixed—for good!"

Twenty minutes later, Stan was back with Mrs. Baumann. Gus gave them both a cheery greeting.

[*Continued on page 250*]

How *CREATIVE TOOL DESIGNING* Helps You Work Easier, Faster, Better:



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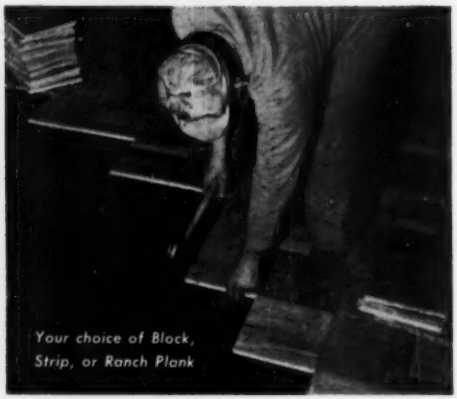

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Bruce Hardwood Floors

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Gus Finds a Golden Thread

[*Continued from page 248*]

"Your friend here—" she gave Stan a flash of brilliant white teeth—"tells me you have my car fixed already. What was wrong?"

"You know what an oil breather cap is, Mrs. Baumann?"

She looked blank.

Stan crowded closer as Gus raised the hood and pointed. "This is it, down by the lower left side of the motor." He reached in his pocket. "And this is what's in it." He held out a long black thread.

Gus Attempts to Explain

"No, don't touch it. Wait till I wipe the grease off," and he pulled the length of thread through a clean cloth.

The thread changed magically from a dull dirty black to a shining red-gold.

"Pretty, isn't it?"

Mrs. Baumann put out a tentative finger. "Yes, quite pretty. What is it?"

"This is part of the packing inside the oil breather cap—wire mesh, like the scouring pads you use in your kitchen. Now, your car is in excellent shape, but it's old, and one of these long wire threads had plenty of time to work itself out of the breather cap, which in this model is not too far from your distributor." Gus looked at her. "This right here—see?—that's the distributor. This sends out the current in the proper dose and sequence to operate the motor."

"Current?" Mrs. Baumann was puzzled. "I thought cars ran on gasoline."

Mrs. Baumann Finds It Heavy Going

Stan winced, and Gus pretended not to notice. "So they do, so they do. Now, this long thread worked quite a way out of the breather cap. Normally, it would hang vertically alongside the breather neck, right here," and Gus pointed again.

"As the months and the years went by it accumulated quite a coating of oil and dirt, and hanging where it was, *between* the breather neck *and* the motor, it got to be about as invisible as anything in plain sight could ever be."

"Very interesting," Mrs. Baumann observed. "But what made the car stop?"

"Occasionally the forward movement of the car or the air blown back by the fan—this is the fan—would flick the hanging thread right over here, to the lead-in wire on the distributor. Bang—no current."

[*Continued on page 252*]

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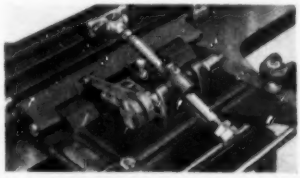

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Gus Finds a Golden Thread

[*Continued from page 250*]

Mrs. Baumann gazed dreamily in the general direction of the engine.

"You know what a short circuit is, Mrs. Baumann. The thread, or the wire, because of its sticky coating of dirt and grease, would cling just long enough to the vital spot here," and he pointed once again, "to completely kill the function of the distributor. Then the thread, without the fan blast to hold it in place, would swing back to where it normally hung, impossible to see."

Mrs. Baumann clucked admiringly. "You certainly have sharp eyes, Mr. Wilson."

Gus grinned. "To tell you the truth, I just happened to be looking right at the distributor when that long thread licked out. I thought I was seeing things."

"Well, *I* think it's just wonderful!" she said. "Now, what do I owe you?"

Gus Settles for a Cup of Coffee

"I hadn't thought about that," Gus said slowly. "I didn't actually install any parts, and to charge you for *all* the time I put in . . . Look, Mrs. Baumann, we're in business here at the Model Garage with the best equipment, the best in gas and oils. Suppose you let us remind you when you're due for an oil change or lubrication, and you can concentrate on remembering your grocery list. Tell your husband, when he gets home from his business trip, that he can buy me a cup of coffee and I'll explain to him what was wrong with the car. All right with you?"

It was all right with her, and they were all laughing when Mrs. Baumann deftly backed the old sedan out of the Model Garage. When she was about to pull away she tooted the horn and Gus went over.

"Thanks again, Mr. Wilson, and there's something else I should thank you for. When you mentioned my husband and the cup of coffee, I just remembered I haven't a drop of coffee in the house. That means another trip to the store right now!" And the Plymouth pulled away. END

Next Month: Gus takes a gamble.

Not Guilty

THE woman tourist posed for a snapshot in front of the fallen pillars of an ancient temple in Greece. "Don't get the car in the picture," she warned, "or my husband will think I ran into the place."—*Fireman's Fund Record.*

"Company pays $1200 for cost-cutting idea!" "Employee wins $350 for suggestion!" Ever wonder how *you* can cash in on *your* company's suggestion system? Check these Bostitch case histories. There may be an idea here for *you* — and *your* company.

BUSINESS: Cabinetmaker

SUGGESTION: Fasten bottoms and sides of small chests with Bostitch foot-powered stapling machine and ⅜" staples.

RESULTS: Five times faster than old method of nailing. Stapling more secure. Workers like it better.

BUSINESS: Gasoline Pump Manufacturer

SUGGESTION: Instead of solder, use ⅜" staples to fasten No. 8 mesh on foot valve bottom of pump.

RESULTS: Production jumped from 20 an hour by soldering to 90 an hour with Bostitch.

BUSINESS: Tile Contractor

SUGGESTION: Instead of nailing metal lath to wood studs and joists, use Bostitch hammers and tackers.

RESULTS: One man can now lath 4 bathrooms in 2½ hours compared to 5 hours the old way.

BUSINESS: Garage Door Manufacturer

SUGGESTION: Metal stitch aluminum panels together with Bostitch wire stitcher. Old method: drill and screw.

RESULTS: Plant turns out 500 doors a day as against 50 before. Stitcher and special table jigs for positioning panels save space, material.

BUSINESS: Vacuum Cleaner Manufacturer

SUGGESTION: To fasten metal discs inside fiber cylinders, use Bostitch metal stitcher instead of punching holes and riveting.

RESULTS: Manufacturer saved $6250 the first year.

BUSINESS: Frozen Food Locker

SUGGESTION: Replace cellophane tape with Bostitch desk-type stapler for fastening ends of frozen food packages.

RESULTS: Labor and material costs cut 50%. Bostitch method gives tight, permanent seal. Unlike tape, will not loosen at low temperatures.

TO HELP YOU find ways to apply Bostitch savings to *your* business, send for the 16-page illustrated booklet, "Time and Money-Saving Case Histories." It's *free*—and full of cost-cutting ideas!

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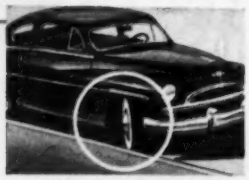
How to get more mileage out of your motoring dollar



"TOE IN" AGAINST CURB

Don't let your car "hang" on parking brake alone. When parking on even a slight grade, always "toe in" front wheels against curb or put car in gear. If you don't, there's always a chance the parking brake may "relax"—and you may be faced with a costly repair job you could easily have avoided.

TIGHTEN BODY BOLTS

Check body and chassis bolts—when you "tune up" this spring. Loose bolts allow car to develop squeaks and rattles . . . may cause wear by developing uneven strains. Torque wrench should be used in accordance with body-bolt torque specifications of car manufacturer.

THIS MEANS TROUBLE!

Check your oil filter regularly, too. In as little as 5000 miles of driving, your filter can become so clogged it can't trap any more abrasives and sludge . . . leaves them free to damage costly engine parts. Get in a new Purolator* Refill *before* that happens. Accordion-pleated, plastic-impregnated element has up to 10 times more filtering area than ordinary filters . . . stops dirt you can't see. The Purolator Micronic* is specified on more different makes of cars than any other oil filter. Purolator Refills come in a full range of sizes . . . cost as little as $1.60.

*Reg. U. S. Pat. Off.

Check your oil filter every time you change your oil

PurOlator

World's finest OIL FILTER

Brain Is Like a Wet-Cell Battery

[*Continued from page 160*]

Sometimes these centers are required to cooperate, sometimes not. You can huddle deeper under a blanket on a cold night without using any orders going higher than the cerebellum, though a vagrant carbon copy of the message, "Baby, it's cold outside," might go up as high as the cerebrum (and cause you to dream of the arctic). On the other hand the smell of smoke in the night alerts all the message centers of all four parts of the nervous system, sets the electrical circuits flashing at a furious rate, and leads to action at the highest level—waking up and finding the fire.

Fingers Use More Brain Cells Than Legs

The size of the brain area utilized for conscious control of each part of the body is not governed by the size of the limb or organ to be controlled but by the amount of control necessary. For example, the hands and fingers, which can perform such complicated maneuvers, require a brain area much larger than that set aside for the legs. The tongue and lips also have a big brain area in proportion to their actual size.

It is possible, in the medical laboratory, to duplicate the electrical impulse generated in the brain when an order is sent to a specified part of the body.

Laboratory Tests Impulses

While the brain is exposed during an operation, a small electric charge applied to the nervous tissues that control the movements of the arms and legs can cause spasmodic jerks of these members. When electricity is applied in the regions where sight and hearing are recorded they can make a patient see flashes of light or hear buzzing, ringing or knocking. Stimulation to a speech center will cause the individual to cry out like a baby but not to indulge in articulate speech, which is too complicated for such stimulation.

These experiments have sometimes been performed on individuals who were

[*Continued on page 256*]

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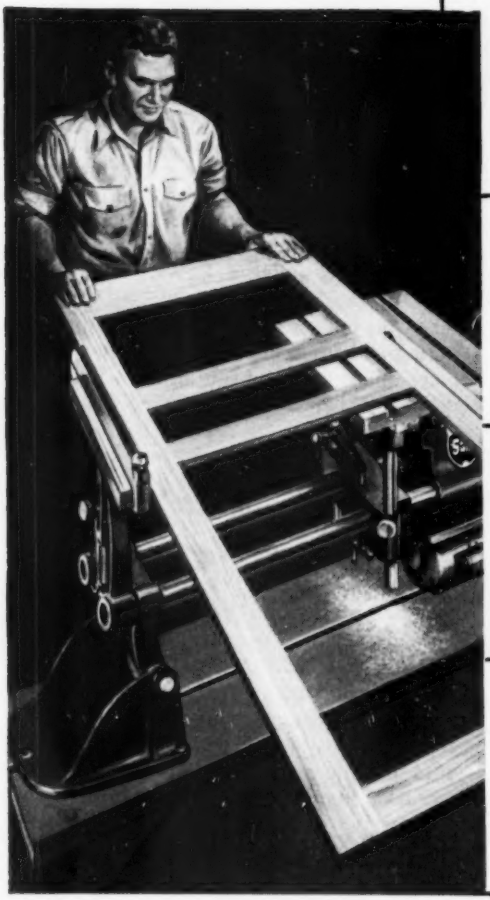
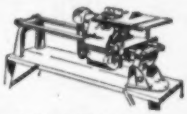
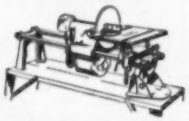
CAPACITY

WITH ANY OTHER POWER TOOL!

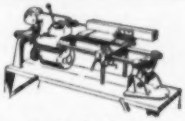




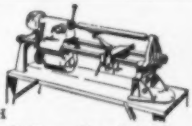
AS A CIRCULAR SAW it can cut 8' panels in half and trim doors, big screens, storm sash. Effective table area, 54" x 17", is *twice* that of most circular saws. Maximum depth of cut, 2¼". Extra-fine depth and blade-to-fence adjustment for greater accuracy.



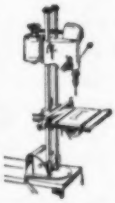
AS A DISC SANDER, the SHOPSMITH handles *room-length* boards. Quick-change 12" discs can be fed *into* work for greater accuracy, speed and safety . . . and precision finishing of duplicate parts. Miter gauge and tilting table simplify compound angle and bevel sanding.



AS A HORIZONTAL DRILL PRESS, size of work limited only by size of room! Making a perfect doweled joint, so difficult with most home power tools, is easy because of horizontal feed. Drilling, mortising oversize furniture or cabinet frames is simple, too.



AS A LATHE, it turns work up to 33" long, 15" in diameter — 4" more than most lathes. Other SHOPSMITH exclusive features: a sliding *headstock* that puts work within easy reach; a swiveling tool rest that slides parallel to work—no need to reset constantly.



AS A VERTICAL DRILL PRESS, the SHOPSMITH drills to center of 15" circle. Both table model (table to chuck, 27") and floor model (floor to chuck, 55"). Jacobs key chuck takes drills from 5/64" to 1/2" dia. Spindle floats on *four* grease-sealed ball bearings.

multi-purpose SHOPSMITH

See SHOPSMITH demonstrated at leading hardware or department stores, or at any Montgomery Ward store.

COMPLETE 5-TOOL UNIT ONLY **$199.50** Motor* and bench extra

FREE! *Fact-packed 16-page illustrated booklet!*

*Special SHOPSMITH *heavy-duty, ball-bearing motors:* ½ *hp.,* **$34.50;** ¾ *hp.,* **$44.50.**

MAGNA ENGINEERING CORPORATION
Dept. 231-A at factory nearest you:
12819 Coit Road, Cleveland 8, Ohio, OR
Menlo Park, California

Please send me a free copy of the SHOPSMITH catalog, and the name of my nearest dealer.

Name _____
Address _____
City _____ State _____

NOW...DRILL CONCRETE LIKE WOOD

with new

"LIVE-SPIRAL" MASONRY DRILL

ROTARY DRILLS ANY MASONRY AROUND YOUR HOME . . . FAST, EASILY, CHEAPLY

Here's the fast, modern way to drill brick, slate, concrete, tile, cast stone . . . any masonry around your home. *Rotary drill* it, like wood . . . easily, cleanly, accurately, with the revolutionary, new Carboloy "Live-Spiral" Masonry Drill.

No more slow, tedious, thumb-smashing hammering on an old-fashioned star drill. This "Live-Spiral" bit with its diamond-hard Carboloy cemented carbide tip zips through toughest masonry with ease . . . won't stall, stick or bind because dust can't pack in its shallow oval flute.

It lets you drill deep, clean holes at any angle . . . makes it a snap to drill holes to bolt down a washer, dryer . . . put in clothes-line hooks, furring strips or partitions . . . attach awnings, trellises, screens, ivy supports, porch shelves, flower boxes, etc., in any masonry anywhere.

Add these Carboloy "Live-Spiral" Masonry Drills to your tool collection now. Cost no more than most ordinary drills; are sturdy, tough, built to last. See offers, below.

HANDY-MAN KIT

A must for your tool box. Contains 3 Carboloy "Live-Spiral" Masonry Drills . . . 1/4", 3/8", 1/2" . . . . *all fit 1/4" chucks.* $6.65 per kit. Ask for it at your local hardware, or send coupon.

FREE FOLDER

Get all the facts on "Live-Spiral" drills, including sizes available, prices, etc. Sizes range from 3/16" up . . . drills of 1/2" and above fit 1/2" chucks. Optional 1/4" shank on 1/2" drill, also. Send coupon.

CARBOLOY

DEPARTMENT OF GENERAL ELECTRIC COMPANY

"Carboloy" and "Live-Spiral" are trademarks of Carboloy Department of General Electric Company

MAIL THIS COUPON TODAY

Carboloy Department of General Electric Company
11173 E. 8 Mile Street, Detroit 32, Michigan

☐ Send me_____Handy-Man Kits at $6.65 per kit, postpaid.
☐ Enclosed is my check or money order for _____
☐ Send C.O.D.
☐ Send me free folder.

Name_____
Address_____
City_____Zone_____State_____

Brain Is Like a Wet-Cell Battery

[*Continued from page 254*]

conscious (brain tissue is not sensitive to pain). They report that they do not feel as though some external force were causing the limbs to jerk or baby-like cries to be uttered. On the contrary, they feel a strong but *inward* compulsion to move the limb or to cry out.

Causes of Mental Ills

Many puzzling phenomena are being cleared up because of our recently acquired knowledge of the electrical processes of the brain. What, for example, causes mental disturbances? It now seems clear that in both retarded mentality and certain types of what the layman calls insanity there is either damage to the brain cells themselves or to their electrical processes.

Brain cells need a heavy supply of oxygen, brought by the blood; if this supply is cut off even for a few minutes, permanent damage can be done. We know that some of an unborn baby's brain cells can be damaged or destroyed if the mother has German measles early in pregnancy, or if she suffers a severe nutritional deficiency. Damage can also result from birth accidents.

Circuits Out of Control

Some mental illnesses seem clearly associated with the inability to bring together a large number of the reverberating electrical circuits in the brain. Excessive anxiety, ungovernable rage and some other unreasonable states of mind evidently result from electrical circuits that have got out of control. In the operation known as lobotomy, fibers that connect two parts of the brain known as the frontal cerebral cortex and the thalamus are severed, to interrupt such crossed circuits.

Our new knowledge suggests why, as we grow older, we tend to forget certain things and to remember others. This happens partly because we are somehow able to seal off certain memories which (perhaps for reasons below the level of

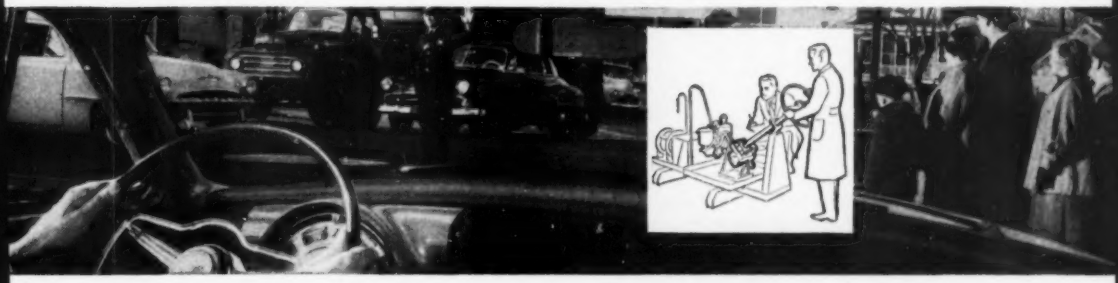
[*Continued on page 258*]

EASIEST TO DRIVE AND THIS IS WHY

There are engineering reasons for every benefit your new Chrysler Corporation car offers you

SITTING IS A NEW EXPERIENCE in the 1953 Plymouth, Dodge, De Soto and Chrysler. Here you ride comfortably relaxed, not all hunched up. On Comfort-Level seats, you can wear your proudest hat without ducking!

THERE ARE REASONS. Testing and studying for years, Chrysler Corporation engineers and coachwork designers developed a new way to "spring" your car that makes your ride steadier, more truly balanced than was possible before. There's plenty of head and shoulder room. Your seeing area has been increased as much as 15%, too.



EASY DOES IT. At a tangled downtown intersection, or out on the bounciest country road, you steer without strain. Available on Chrysler and De Soto, full-time Power Steering makes steering your car easy as dialing a phone.

THERE ARE REASONS. Careful oil pressure tests are part of the behind-the-scenes development of full-time Power Steering. This popular Chrysler Corporation exclusive relieves you of 80% of your normal steering effort. And another Chrysler advance, Power Braking, uses engine power to make braking easier and quicker for you, too.

Back of every development that makes your Chrysler Corporation car so easy to drive are the talent and experience of engineers, scientists and technicians with the one aim—to produce fine cars of superior worth. **CHRYSLER CORPORATION**

engineers and builds **Plymouth, Dodge, De Soto, Chrysler Cars & Dodge Trucks**

Chrysler Marine & Industrial Engines • **Oilite** Metal Powder Products
Mopar Parts & Accessories • **Airtemp** Heating, Air Conditioning, Refrigeration • **Cycleweld** Cement Products

If You Make Painting a Hobby-

You'll get a lot more real satisfaction and pride of ownership out of a home that is clean and neat and trim in a fresh coat of paint! Pays its own way by improving your property, too!

Because Archer Pol-mer-ik contains polymerized oil, it gives you a tougher, more durable paint film than ordinary linseed oil. When you reduce your paints with Pol-mer-ik, they brush easier, level better, and give you a smoother, dirt-resisting finish. Wonderful brush conditioner, too!

Handiest single product in your house or shop. Does the job of a dozen specialized products. A few of

POL-MER-IK'S 101 HANDY USES:

ARCHER
Pol-mer-ik
LINSEED OIL
PROTECTS MOST EVERYTHING

Brain Is Like a Wet-Cell Battery

[*Continued from page 256*]

consciousness) are disagreeable to us. It is also, in all probability, because certain circuits were set up originally with an unusually large number of brain cells, nourished with plenty of oxygen and guaranteed to keep going for a long time. Every adult person has found that he remembers experiences of his childhood more vividly than he does things which happened last month or last year. What we now know about memory strongly suggests that the well functioning blood circulation of the child may play a decisive role in this fact.

Mind Improves with Use

What we now begin to know of the processes of the brain is extraordinarily hopeful and reassuring. It seems certain that the wisest man in history, whoever he may have been, did not in a lifetime of devoted study use more than a tiny proportion of the capacity of his brain to set up reverberating circuits. The more you learn, the greater the store of memories on which you will be able to draw. The more you exercise the function of combining hundreds of circuits into larger ones, the easier it becomes, and the more extensive these circuits will grow to be.

The late Sir Charles Sherrington, the great authority on the brain, after pointing out that man's brain is, in proportion to his weight, far larger than that of any of the animals, suggests that its evolution is still continuing: "Nor is the brain's present state, we may suppose, more than an interim phase, on the way to something else, something better, we may hope."

If any more exciting prospect can be held out to mankind, I don't know what it can be. END

Signs of Age

WITH both girls and autos, the paint conceals the years but the lines give them away.—*The Columbia Crew.*

Here's a New Portable Jig Saw with a Real Motor made by Black & Decker

And it converts quickly to a handy, stationary (table model) Jig Saw

Only* $49.50 *complete with 5 different blades

(coarse tooth, fine tooth, 2 metal-cutting, knife blade)

There's nothing like the Black & Decker Utility Portable Jig Saw! It does the work of a Jig Saw, Sabre Saw, Keyhole Saw, plus most Band Saw operations! Fits in the palm of the hand—all you do is guide it! Or, it mounts in an accessory table in 10 seconds. It's perfect for home repairs, plumbing, hobby projects, electrical work, furniture, signs, displays, floor-covering installations, etc. A specially-designed B&D motor, custom-made for the tool, assures smooth, steady operation. Try this handy, new Black & Decker Utility Jig Saw at your nearest hardware, building supply, appliance or department store!

Jig Saw Converts to Table Model in Seconds

With the Accessory Table, you have a bench model saw that supports the work while you cut. Improves accuracy and frees both hands for guiding. Miter Gage and Rip Fence assure accurate angle cuts and smooth, even ripping. Price, complete, only $14.95.

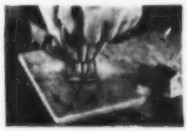
Cut these materials in a jiffy with this B&D Jig Saw

- ★ Hardwood, softwood, plywood
- ★ Ferrous metals, non-ferrous metals
- ★ Plastics, leather, rubber
- ★ Composition boards, insulating materials

Here's why the B&D Portable Jig Saw is your best buy!

Sabre-type blade makes pocket cut without need of "entrance" hole.

Compact, lightweight . . . fits the palm of the hand. Guides easily.



Fan cools motor and directs air stream to blow sawdust away from guide line.

HARDWARE WEEK SPECIAL

B&D Utility 6" Heavy-Duty Saw Plus Depth-and-Bevel Attachment . . . BOTH FOR ONLY . . . $59.50

Black & Decker

UTILITY PORTABLE ELECTRIC TOOLS

FREE! Book of hints to make home repairs and hobby projects easier. Mail to: THE BLACK & DECKER MFG. CO., Dept. H4S, Towson 4, Md.

Name ----------

Address ----------

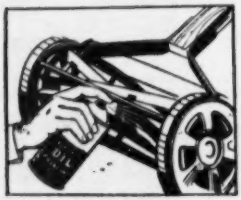
City ---------- Zone ---- State ----------

Biggest Oil News In 50 Years!

Lubricates and Protects with Amazing "MIST-ACTION"

NOW! Big news for mechanics, home craftsmen, gardeners, etc.! New 3-In-One Oil *spra-gun* is easier, faster, cleaner, *more effective!*

Spray Tools To Keep 'Em CLEAN!



IN SECONDS... spray saws, chisels, planes, locks, hinges, springs, etc.

No messy rags... oily fingers!

IDEAL for mowers, shears, clippers, other garden tools!

Contains Special Rust Inhibitor!

ACTUAL TESTS by immersion show that 3-IN-ONE Oil prevents rust where other oils fail!

JUST PUSH VALVE—OUT COMES FINE MIST OF OIL!

3-IN-ONE Oil also available in the familiar Spout Cans in 10¢, 15¢, and 25¢ Sizes

New 3-IN-ONE spra-gun

They're Building A-Sub Like Torpedo

[Continued from page 174]

from the atoms to the turbines. This has to be really closed, absolutely airtight, because the water it carries is radioactive—and dangerous. Ordinary pumps may leak a tiny bubble of air around the bearings without serious consequences, but those in this circuit must not. So pumps and motors that never require maintenance were perfected, to be placed right in the circulating water.

Q ***Won't radiation damage the machinery?***

A No—but it would if you didn't plan for it. The alloys used for ordinary high-temperature work have too strong an affinity for neutrons and would bleed them off on this job. On the other hand, most metals that stop neutrons do not have the tensile strength and high melting points required. So there had to be a "new" metal. This is zirconium—a curious metal about which, until recently, we knew little. What we did know wasn't very hopeful. It hadn't been refined to a pure state, even in laboratory quantities. And in its impure state it had a high affinity for gases. But it had one big asset, a very high melting point, possibly as high as 3,100°. After a huddle over this problem, metallurgists have come up not only with a means of getting pure zirconium in quantity, but ways of handling, shaping and applying it.

Q ***Will it take supermen to run this super submarine?***

A No—at least so far as its atomic aspects are concerned. Even though the crew will share their ship with a "hot" atomic pile, they will be just as safe as the people who operate the AEC's atomic reactors ashore. Whether men will be able to take months in the depths of the ocean without a glimpse of the sky or a breath of fresh air, remains to be seen. This past winter, 23 Navy volunteers underwent a two-month test bot-

[Continued on page 262]

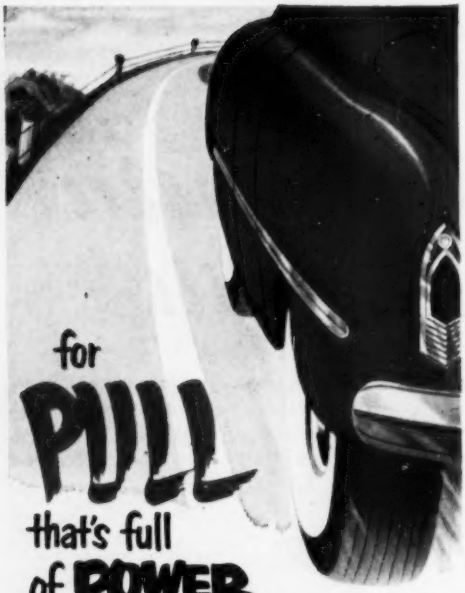
on every Pontiac ever built

AC Spark Plugs — original equipment on the first Pontiac car — have been Pontiac's partner ever since 1926. AC's patented *CORALOX* Insulator is one big reason for this preference. *CORALOX* gets hot quicker to burn away oil and wet carbon deposits . . . resists deposits of oxide coatings — stays clean longer . . . provides four times greater heat conductivity . . . has three times the mechanical strength . . . offers ten times greater electrical resistance at high temperatures.

For Pontiac owners — and owners of all other makes of cars — these outstanding *CORALOX* advantages mean — GREATER GASOLINE ECONOMY — SMOOTHER PERFORMANCE — LONGER PLUG LIFE.

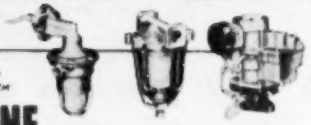
Original Equipment on Nearly as Many New Cars as All Other Makes Combined

AC SPARK PLUG DIVISION GM GENERAL MOTORS CORPORATION



for
PULL
that's full
of POWER
Enjoy Spring Driving with this
CARTER

POWER CENTER™
LIFE-LINE



THE FUEL PUMP to insure fuel supply
THE FILTER to clean the fuel
THE CARBURETER to vaporize and meter the right fuel mixture for your engine

Put your car on a "balanced diet." For peak power and mileage from every drop of gasoline, ask your mechanic to check the fuel system that "feeds" your car, and replace worn parts with CARTER Life Line products.

Look under CARBURETER in the yellow pages of your phone book for the address of your nearby CARTER dealer.

CARTER CARBURETOR CORPORATION
St. Louis 7, Missouri
Division of American Car and Foundry Company

They're Building A-Sub Like Torpedo

[Continued from page 260]

tled up aboard the USS *Haddock*. The submarine was moored on the surface, but conditions for the men matched those of a long cruise without surfacing. One big point studied is how well men can endure the higher than normal concentration of carbon dioxide that builds up during long periods underwater.

Q ***Is the atom sub close to reality—or is it still just a dream ship?***

A The Navy isn't saying when the first atomic-powered submarine will start on its trial run—but it's no dream ship. A prototype of the atomic power plant, the plant itself, and the steam propulsion system are in various stages of construction at Arco, Idaho. The hull is on the ways at Groton, Conn. Firms scattered across the country are designing and building the wholly new machinery. END

What Would You Do?

I had glued some fine veneer to a lumber back before I realized that I had no gluing press to clamp it in. Then I remembered the ready-made, no-cost press standing out in my garage. I put the stock between plywood sheets, laid the bundle on the floor, and jacked my car over it. —*J. Belden, Augusta, Me.*

Have you pulled off a smart one lately? PSM will pay for acceptable contributions showing ingenious solutions of problems in the home, shop, garage or camp. It doesn't matter if it's wacky—if it works. Use government postcards only. Contributions cannot be acknowledged or returned.

ENTER $1,000.00 CASH SYNCRO SANDER CONTEST

IT'S EASY! IT'S FUN! NOTHING TO BUY!

WIN one of these 43 CASH PRIZES!

1st Prize **$500**

2nd Prize **$200**

3rd Prize **$100**

40 Prizes $5 Each!

HOW TO ENTER

(1) Find the correct "missing" Jingle Words. It's fun—easy! Look for them *now* below sander *picture* in *type* following "Syncro Sander Features." **(2)** Complete the Contest Sentence in 15 additional words or less. **(3)** Give hardware store name. ***That's all!*** Use "Ad Entry Blank" or plain paper—send it direct to Syncro. **OR** use Entry Blank printed in Free Contest Folder—get at dealers' or mail Ad Coupon. Send no money — no wrappers — and there's NOTHING TO BUY!

BRIEF CONTEST RULES

• **Judges:** WALT DURBAHN, master craftsman, TV star; RUSSELL JOHNS, Publisher; HARRY J. HOBBS, Publisher. Their decision is final. • **Prizes Awarded** on combined basis of correct Jingle completion plus aptness of thought in finishing Contest Sentence in 15 additional words or less. • **Period:** Contest starts March 1, 1953, ends May 31, 1953. All envelopes bearing Entries must be post-marked not later than midnight May 31, 1953. • **Prize Winners** notified and paid soon after June 15, 1953. • **Contest Limited** to Continental United States.

SYNCRO SANDER FEATURES:

Sands 10 times faster than hand-sanding. SMOOTHER finish, too! Proven best for vertical and overhead use because it is so powerful, so much LIGHTER. Syncro is the only electric sander with Double-Arc motion which cleans as it sands. Works so easily you "finger-guide-it!" Save money and TROUBLE doing your own refinishing at home with Syncro. Just remember—Syncro is the only sander giving you a GUARANTEE which says, "Syncro Power Units guaranteed against burn-out all during your ownership or replaced free!" (The Missing Jingle Words are among those you have just read).

Isn't this FUN! Nothing to buy — no wrappers or labels to send—just a few minutes of your time and you may WIN one of the 43 CASH PRIZES totaling **$1,000!** Just correctly complete the Missing Words Jingle—finish the Sentence (both shown in Coupon-Blank below) and mail YOUR Entry now! Or send Coupon for Free Contest Folder—or drop in at your nearest hardware to TRY a Syncro Sander and get a FREE Contest Folder. *Hurry!*

$1,000 CASH CONTEST FOLDER FREE AT HARDWARE STORES OR SEND COUPON!

Use As ENTRY BLANK or INFORMATION COUPON

Fill-in missing words of **CONTEST JINGLE:**

SYNCRO SANDER HAS A LOT OF FEATURES OTHERS HAVEN'T GOT:

S_____ER, L_____ER, _____-FREE

PLUS AN HONEST _____**EE!**

Complete This SENTENCE in 15 additional words or less: I LIKE SYNCRO SANDER BECAUSE_____

Hardware Store Name_____

MAIL TO SYNCRO CORPORATION, Contest Dept. G-43 OXFORD, MICHIGAN

Your Name_____

St. & No._____

City_____ STATE_____

☐ I'll enter LATER Send FREE FOLDER

SYNCRO ELECTRIC SANDERS

SYNCRO CORPORATION
CONTEST DEPT. G-43
OXFORD-MICHIGAN USA

SYNCRO POWER UNITS GUARANTEED AGAINST BURN-OUT DURING YOUR OWNERSHIP OR REPLACED FREE!

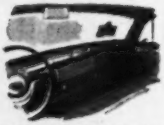
TIME SAVING TIPS

ALL YOU NEED IS A TUBE OF

DU PONT DUCO CEMENT

REG. U.S. PAT. OFF.

MAKE FISHING LURES and secure loose line guides with tough, waterproof Du Pont "Duco" Cement.



LOOSE WINDOW STICKERS need not flap or peel off. Replace with transparent Du Pont "Duco" Cement.

CHIPPED KEYS strike a sour note in a piano's appearance. Mend broken keys with "Duco" Cement.

TIPS FOR SHOELACES. When metal or plastic tips break off laces, form new tips with "Duco" Cement.

A WATCH CRYSTAL won't keep popping out when you use transparent "Duco" Cement to hold it in place.

INDOOR TV ANTENNAS won't mar polished surfaces when felt bases are attached with "Duco" Cement.

NAME PLATES IN OVERSHOES prevent mix-ups in the school coatroom. Put them in with "Duco" Cement.

REPAIR CHIPPED GLASS. The transparency of "Duco" Cement makes the repair neat—almost invisible.

A HOUSEHOLD FAVORITE FOR 25 YEARS

DU PONT — BETTER THINGS FOR BETTER LIVING ... THROUGH CHEMISTRY

REG. U.S. PAT. OFF.

WINTER OR SUMMER

DO EVERY OUTDOOR JOB FASTER—EASIER—BETTER

WITH A GEORGE GARDEN TRACTOR

$119.50 F.O.B. Sullivan, Ill.

Illustrated: 2 wheel, 2 HP GEORGE Garden Tractor, Briggs or Clinton Engine

SEND TODAY Write for free copy of illustrated George garden tool folder. See how a George garden tractor can do every outdoor chore. George Garden Tool Div. Box PS-4 Sullivan, Illinois

Your George garden tractor is a multi-purpose, year-round work saver. In price, it compares with a power mower. In use, the George garden tractor is incomparable. Complete range of attachments for tilling gardens... mowing lawns ... cutting weeds ... removing snow. A George tractor is ideal for every purse and purpose.

GEORGE GARDEN TOOL
Div. of Community Industries Ass'n

NOW! SAW 2x4's IN ONE EASY CUT WITH NEW LARGER 'ARCO-SAWS'

AT BETTER HARDWARE STORES EVERYWHERE

ARCO SAW

No. 455 "ARCO-SAW" For Depth & Bevel Cuts. $12.50 with ALL GAGES & 5" "ARCO SAFECUT" Blade.
No. 454 "ARCO-SAW" For Straight Cutting. Same as above, less gages. Has accurate Visual Guide..... $10.95

AMAZING NEW SAFE-CUT BLADE ALLOWS ANY ¼" DRILL TO WHIZ THRU HEAVY LUMBER, WALLBOARD, PLYWOOD, etc.

At last, here are the first—**the only**—gear driven saw attachments to whiz thru 2x4's in one cut! Imagine, now you can build **anything** from bookcases to a bungalow with these sensational new saws. A moderately priced drill will do the job because of new "ARCO SAFECUT" Blade.

ONLY "ARCO" GIVES YOU THESE FEATURES: 5-inch Safecut Blade—cuts faster—uses 30% less power, **Graduated Depth & Bevel Gages** for cuts to 1¾"—bevels from 0 to 45°, **Adjustable Rip Gage & Visual Guide, Sturdiest and Easily Adjusted Safety-Yoke** keeps drill steady, **Worm Drive Clamp** releases drill in seconds, **Precision Gear Box with Steel Gears.**

90-DAY FACTORY GUARANTEE.

REPLACEMENT BLADES: Specify 5" Safecut, or Combination, or Rip, or Crosscut Style..... **$1.75**

UNCONDITIONAL 10-DAY MONEY-BACK GUARANTEE

DEALERS: Write for nearest jobber

BUY THE BEST—see your hardware dealer now! Don't accept inferior substitutes—if not available send us check or M.O. (Postpaid). C.O.D.'s—postage extra.

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"Takes miles in its stride"...

HERE'S real get up and go . . . and two-wheeled luxury . . . as you twist the throttle on the greatest motorcycle ever. It's years ahead in design . . . miles ahead in power. The improved, 55 HP, 74 OHV motor features rotating valves, hemispherical combustion chambers and hydraulic valve lifters. And you'll never match this powerful beauty for sheer riding comfort on 5-mile jaunts or 500-mile trips. Visit your Harley-Davidson dealer today. Bring along a buddy. Write for free illustrated literature. Send 25 cents for your copy of the action-packed, picture-filled ENTHUSIAST Magazine. Harley-Davidson Motor Co., Dept. PS, Milwaukee 1, Wisconsin.

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EVERY EXTRA QUART IS A WARNING!

Your piston rings warn you when they need to be replaced—with oil-pumping, mounting oil bills, smoke from the exhaust. But the success of your *ring replacement* is largely up to you.

As your engine gets older, the cylinders wear tapered and out-of-round. The engine runs hotter because of accumulations in the cooling system. It needs more oil on the cylinder walls. Yet this extra oil must be kept under full control—so you get generous lubrication without a bit of waste.

This calls for special *replacement* rings.

Hastings makes replacement rings exclusively . . . devotes all its research, on the highways and in the laboratory, to the particular replacement problems of each make and type of engine . . . for re-ring, re-bore and re-sleeve.

Hastings rings are nationally known for their ability to stop oil-pumping, check cylinder wear, restore engine performance.

At the first sign of oil-pumping or performance drop-off, go to your motor specialist. If rings are the trouble, he will gladly install a Hastings Steel-Vent replacement set. Truly the best money you can spend on your car.

HASTINGS MANUFACTURING CO. • HASTINGS, MICHIGAN
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Piston Rings, Spark Plugs, Oil Filters, Cavite, Drout

HASTINGS

STEEL-VENT PISTON RINGS

BUILD YOUR OWN POWER TOOLS—TILT/ARBOR SAW, BANDSAW, BELT SANDER

SAVE $50. OR MORE

Exclusive GIL-BILT Build-It-Yourself Features

- No machining—build easily with hand tools only
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- Sturdy wood, aluminum and steel construction
- Capacity and performance of commercial saws selling for $60 and up

GIL-BILT 10-INCH TILTING ARBOR SAW

- 27x28 in. table, 13½ in. capacity in front of blade
- 10 in. blade cuts 3¼ in. deep, tilts full 45 degrees
- Floor model 34" high, table always stays level
- New Departure ball bearing arbor, ¾" precision shaft turned down for ⅝" bore blades, alum. housing, shipped ready to run.
- Jackscrew and 4½ in. dia. handwheel lowers and raises blade
- Cast aluminum miter gauge and self-aligning rip fence guide

GIL-BILT Metal Parts Kit includes Plans, ball bearing arbor, miter gauge and bar, rip fence guide, dado insert, lock knobs, jack screw mechanism and handwheel, and all other metal parts (less blade).....$21.95
Same Kit with 10" Combination Blade....$24.90
Same Kit with 8" Combination Blade....$23.90

GIL-BILT 12-INCH BAND SAW

- Cuts to center of 24 inch circle
- Handles stock up to 6 inch thick
- 16x18 inch table tilts 45 degrees
- Lower wheel and drive pulley runs on sealed New Departure Ball Bearings; Upper wheel runs on two ⅜" bore Oilite Bronze bearings.
- Upper wheel tension and tilt mechanism of cast aluminum, completely assembled.
- Upper and lower blade guides. Each has ball thrust bearing, self-lub bronze jaws
- Rigid cast aluminum wheels fully machined ready-to-install. Heavy rubber tires.
- Uses standard ⅛ inch blades up to ⅜ in. wide.
- Fully enclosed mechanism for utmost safety.

GIL-BILT Metal Parts Kit includes Plans, rubber tires, aluminum wheels, 1¼ in. blade, ball bearing spindle, tilt mechanism, blade guides, table tilt segments, and all other metal parts.....$21.95

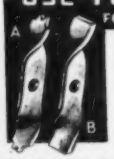
Return Kits in 10 days for refund if not satisfied.
(Prices include postage within 300 miles. Over 300 add 5%.)

Also available—Plans and Parts Kit for 18" Band Saw, Belt Sander and 8" Tilt/Table Saw. Order Plans at $1.00 each—Sent postpaid anywhere in the world or write for FREE descriptive catalog.

GILLIOM POWER TOOLS P.O. Box 1-VD, Lambert Field St. Louis 21, Missouri

USE YOUR BENCH SAW

FOR JOINTING & CUTTING MOULDINGS



With our six inch tool steel cutters make mouldings, casings, drop-leaf tables, grooves beading and jointing. Mouldings cutters, A 1 in. wide $1.75. 1½ in. $2.25. Jointing cutters, B 1 in. $1.75. 1½ in. $2.25. E 1 in. for drop-leaf tables. $1.75. E 1½ in. Makes ¾ in. cove & Quarter. $2.25. Postpaid. Guaranteed. State size hole. List & Folder free.

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Rt. 2-P. Clearwater, Fla.

NO PARTS TO FLY OFF!!

SPECIAL OFFER—Only 10¢
50-Page "Tools and Rules" Book

"The Tools and Rules for Precision Measuring" tells how to make accuracy a habit, shows the methods skilled mechanics use. 100 pictures plus reference tables. Send only one dime. Address Dept. PS.

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SCORES OF PROJECT PLANS for approximately 1¢ each!

Attached is $1—please send me the next 6 issues of the DELTAGRAM, the finest woodworking publication in the world —12 to 15 practical projects, all shop-tested, in every issue.

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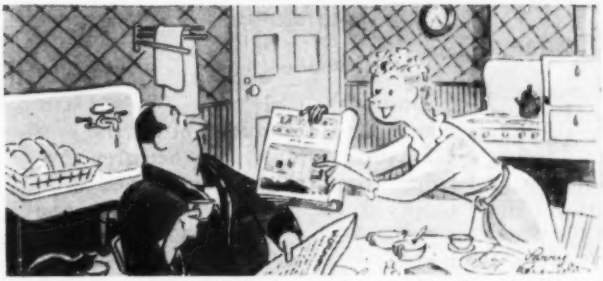
Clip a $1 Bill here

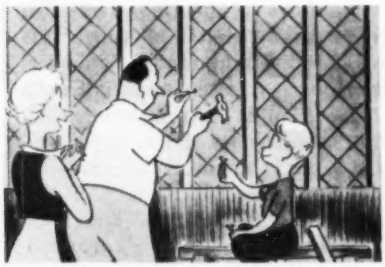
"Pine Panel" your kitchen

the low-cost Gold Bond way!



"Here's how this barn of a kitchen ought to look!" My wife told me, brandishing a copy of the Saturday Evening Post with a Gold Bond ad in it. It was a knockout of a kitchen, all right, but I was afraid it was too expensive for us. All that wood paneling made it look like a millionaire's dream.

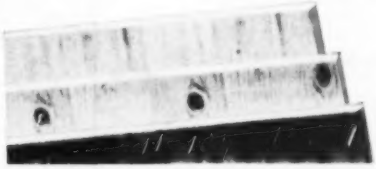
Our Gold Bond dealer showed us Gold Bond Gypsum Grainboard...the inexpensive wallboard that looks like natural wood paneling. He figured the amount needed—and helped plan the room.



We started by nailing "filler strips" to make the wainscoting and upper wall even, so the final grainboard wall would be flush from top to bottom. The dealer gave us simple instructions to follow.

Then we nailed up planks of Gold Bond Gypsum Grainboard with a finish that looks just like knotty-pine and gives the walls a "fine antique" look. Planks are lightweight and easy to handle. You can saw and nail as easily as wood. Best of all, gypsum is fireproof.

Gold Bond Gypsum Grainboard gave us an expensive-looking kitchen at little more than ordinary wallboard cost. And at the same time, made it easy for us to do our own remodeling.



Besides Knotty Pine, there's new rich-toned Dark Walnut and warm Bleached Walnut. Nails match the finishes. See your local Gold Bond lumber and building materials dealer today—or send 10c for a copy of "Remodeling Magic."

NATIONAL GYPSUM COMPANY
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Fireproof Wallboards, Decorative Insulation Boards, Lath, Plaster, Lime, Sheathing, Roofing, Siding, Wall Paints, Textures, Masonry Paints, Rock Wool Insulation, Metal Lath and Sound Control Products.

EASY WAY TO PEEL OFF OLD WALLPAPER

EASYOFF remover saves up to $15 per room

This is the simplest, most economical known method of removing wallpaper. You just mix EASYOFF with warm water and brush, sponge or spray on. It penetrates the paper and dissolves the paste, so all the old wallpaper can be peeled right off. Will not injure wall surface or woodwork.

If your paint or wallpaper dealer doesn't have EASYOFF, mail $1.00 for 6-oz. bottle that makes 3 gallons of remover—enough to remove paper from one large or two small rooms. Money-back guarantee.

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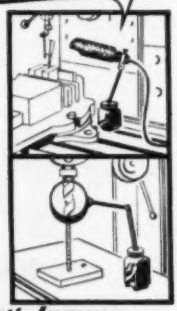
2366 S. Lauderdale, Memphis 6, Tenn.
Makers of Highest Quality Removers

New LUFKIN MITI-MITE
MAGNETIC PRODUCTS HAVE HUNDREDS OF USES IN HOME AND SHOP!



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$8.50

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FREE MITE-MITE BOOK

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RUSH ME YOUR FREE BOOKLET DESCRIBING LUFKIN MITI-MITE MAGNETIC PRODUCTS.

Name _____
Street _____
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Saucers on Radar?
[*Continued from page 171*]

give rise to the galloping-ghost saucers, temporary fluctuating patches of warm air can produce an even more spectacular phenomenon. Lacking precise meteorological data, I must base my interpretation on experiments made during World War II.

Atmosphere as Rough as Sea

During the early stages of short-wave communications, studies of the transmission demonstrated the occurrence of strong "scintillations," or changes in intensity of the received signal. The phenomenon was akin to "fading" of the broadcast waves, so familiar to users of radio sets 20 or more years ago.

These studies during World War II indicated the source of the trouble. During or after a hot day, the air suffers from inequalities of heating. Here we find an ascending patch of warm air; there we note a falling mass of cold air. The atmosphere is often as rough as a choppy sea—though its transparency often keeps us unaware of the irregularities. At night, however, exceptional twinkling of the stars can reveal the presence of highly agitated layers of air—and such twinkling was often noted while the saucer armada was "invading" Washington skies. A long, hot, dry spell set the stage for the saucer apparition.

Signal Deflected

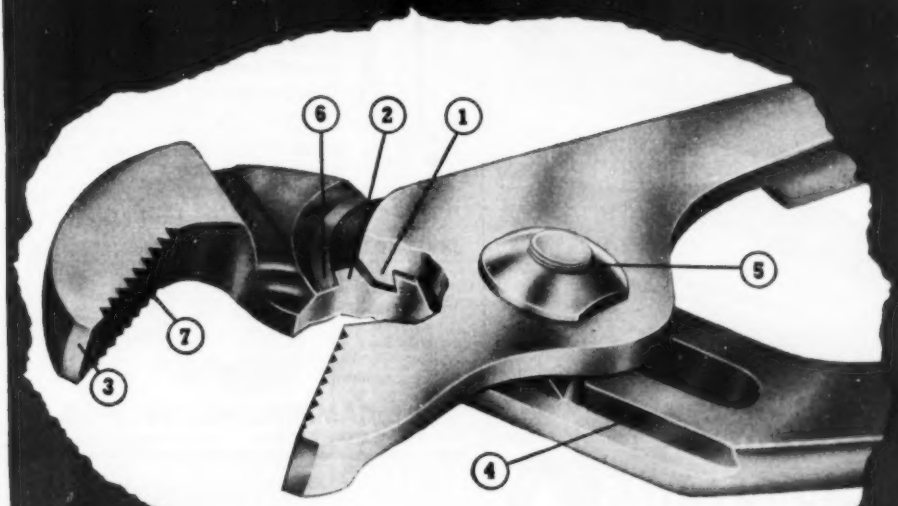
If moving masses of warm air can make the light rays wobble and twinkle they can do much the same with short radio waves. Hence radar or television signals can bounce from one of these hot air clouds, like light waves from a wobbling mirror. Hence a radar signal that would ordinarily be useful only for tracking a plane high in air, can be deflected earthward, there to be reflected from a distant building or tank.

Television reception displays similar characteristics. Receivers in "fringe areas" suffer most from changes in the weather. Last summer, friends at the

[*Continued on page 296*]

The BEST is now BETTER than ever

CHANNEL LOCK



Look at these NEW features . . .

1. Interlocking principle positively prevents slipping under any load . . . the heavier the job, the greater the interlocking action.
2. New type wide base lugs provide maximum cross section strength . . . cannot shear.
3. New nose design provides greater utility for gripping small objects.
4. Patented design of tension edge provides more strength and eliminates stress concentration at channels.
5. New interlocking design minimizes stress on joint bolt.
6. Precision machined interlocking surfaces provide perfect fit, thus distributing pressure evenly.
7. "Rite Angle" teeth guarantee maximum bite and minimum wear.

Send for your Catalog today.

Here's the new, improved Channellock Plier—bringing to you new features which offer more positive gripping, greater strength and longer wear. The undercut interlocking channel is the first really new idea in plier design in years. Engineering skill has developed a plier with new patented features which give you the newest, strongest, most practical plier you can buy. Here is a plier that will last for years! Channellock Pliers—made only by Champion DeArment Tool Co., Meadville, Pa.

Channellock pliers are listed in the Yellow Pages of most Telephone Directories under "Tools"

THE PLIER DESIGN THAT OBSOLETES ALL OTHERS

Only CHANNEL LOCK

CHAMPION DeARMENT TOOL CO. • MEADVILLE, PA.

RUN AND REMOVE NUTS EASIER . . .

9 TIMES FASTER!

Handles tough nut running jobs easily and fast—even frozen nuts no wrench could budge—in one-tenth the time! Also Drills • Reams • Taps • Drives Screws • Drives and Removes Studs • Wire Brushes • Saws Holes • Drills Masonry • Drives Wood Augers. Standard Attachments handle all operations. 1900 rotary impacts per minute—forward or reverse—do all the work. Motor never stalls . . . can't burn out.

3 SIZES fit every need . . . 4U, 8U and 34U (extra heavy duty). Size 4U Impactool only $120.00, also available in metal kit with multi-purpose attachments. Sold by all leading automotive jobbers and industrial distributors. Ask for a demonstration or write for catalog.

865-10

Ingersoll-Rand

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ORIGINATOR OF IMPACTOOLS—AIR AND ELECTRIC

CAMPBELL-HAUSFELD
Spray Painting Outfits

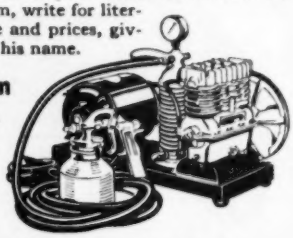
SAVE *time, materials and money*

PAINT buildings, tractors, trucks. Refinish furniture and fenders. Inflate tires; lubricate motors and implements. Destroy weeds. Rid live stock and pens of pests and parasites.

First job pays for the outfit. Then it is yours for a lifetime of trouble-free service. 4 models at 4 money-saving prices. If your dealer does not have them, write for literature and prices, giving his name.

pressure queen

The only 4 cylinder portable. Outperforms them all for spray painting without pulsation.



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SMALL! POWERFUL!

America's finest low cost tractor. Ruggedly built. Easy to operate. No belts, no chains. Borg-Warner clutch, trans. and diff. 140 to 1 reduction. 40% more drawbar pull than ordinary tractors. 8-1/4 H.P. engine—gasoline or kerosene. 20 quick change implements. Write for complete details.

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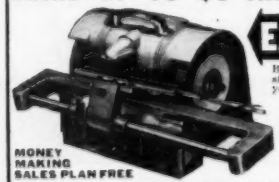

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Big profits in your spare time sharpening scissors. We show you how to start making money immediately. This is your chance now to have your own business and a steady income. Sharpen a pair of scissors in less than two minutes! A child can operate it. Weighs only 10 lbs. Every home, barber, tailor, dressmaker—everybody uses scissors and all need sharpening two to four times a year. Don't let some one else beat you to this opportunity. Write immediately to

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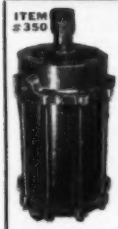
SAVE ON BRAND NEW HEAVY DUTY HYDRAULIC and AIR EQUIPMENT

Large supply of new labor-saving, economical hydraulic equipment in many types and sizes. Use these positive, highly efficient smooth pressure hydraulics on presses, arbors, lifts, loaders, power control, positioning, brakes, plastic dies, auto frame alignment, etc.

ALL ITEMS UNCONDITIONALLY GUARANTEED

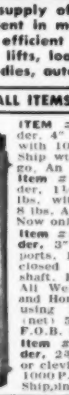


ITEM #350

LOGAN AIR CYLINDER Item #350 — Double acting pneumatic cylinder. 6" bore, 6" stroke, 1½" shaft. Adjustable cushions at both ends. Flange mounting at shaft end. Overall length closed 18". Ideal for use in 125 PSI systems. Shipping weight 40 lbs. F.O.B. Chicago.... **39.50**

LOGAN 4-Way, Foot Operated AIR VALVE. Item #59. Model 6520— Ideal for operating air vises, presses, air machinery, and other double acting pneumatic devices. Heavy cast construction. Standard ½" pipe thread ports. Overall dimensions 8½" x 5¾" x 7½". Gov't. Acquisition cost $42.00. Shipping weight 28 lbs. An outstanding buy. F.O.B. Chicago **15.00**

ITEM #59



ITEM #1036

ITEM #42—Double action hydraulic cylinder. 4" bore, 18" stroke. Rated lift capacity with 1000 PSI line pressure is 12,500 lbs. Ship wt. 30 lbs. F.O.B. Chicago. An Excellent Buy for..... **32.50**

Item #16C—Double acting hydraulic cylinder, 1½" bore, 26" stroke. Will lift 1760 lbs. with 1000 PSI line pressure. Weight 8 lbs. A $55.00 value. Now only .....Postpaid **16.95**

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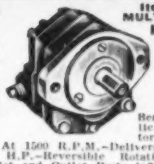
Item #150—Double acting hydraulic cylinder. 2¾" bore, 12" stroke. Use either foot or clevis mounting. Will lift 4400 lbs. using 1000 P.S.I. Overall length 19½". Shipping weight 8 lbs. Postpaid **18.00**



Item #55 MULTI PURPOSE HYDRAULIC PUMP OR MOTOR

Silent, High Efficiency Helical Gear Type Ball Bearing, Hydraulic Pump or Motor. Rated 8 Gal. Per Min. At 1500 R.P.M.—Delivers—1000 P.S.I. Using 6 H.P.—Reversible Rotation—¾" Pipe Thread Inlet and Outlet Ports—½" Drain Port—¾" shaft with keyway and flat for either direct or pulley drive. Dimensions—5⅝" high, 7½" long, 5⅛" wide. Shipping weight 18 lbs. F.O.B. Chicago **45.50**

Item #126—Four-way, open center control valve with built in adjustable relief valve. Factory set at 1000 P.S.I., spring loaded neutral position, for use with one double acting cylinder. In neutral position cylinder is locked and pump unloaded. Fully balanced plunger type, smooth, positive easy operation. Can be used as single unit or mounted in series of any combinations desired. Has ¾" pipe thread inlet and outlet, ½" pipe thread cylinder ports. Newly manufactured to our specifications. Shipping weight 15½ lbs. An outstanding buy! F.O.B. Chicago **21.50**

Item #126

CENTRIFUGAL PUMP

General Motors—Allison

200 GALLONS PER MINUTE

(ITEM #130)

Brand New

For Draining Basements
Fire Fighting • Irrigation
Fuel Transfer
Swimming Pools
Home Water Systems
Dewatering

Converted for high volume commercial, home, and industrial use. Standard 2½" pipe thread inlet, twin 1¼" pipe thread outlets. Ball bearing supported ¾" shaft. Easy priming. Rotation, counter-clockwise facing shaft. Gov't. acq. cost $145.00. Complete with full instructions. Ship. wt. 35 lbs. F.O.B. Chicago **39.50**

TYPICAL PERFORMANCE DATA

Suction Lift	Head Pressure	Gal. Per Min.	H.P.	R.P.M.
10'	75'	260	6.0	3500
10'	65'	200	5.4	3500
10'	80'	40	1.5	2500
10'	50'	140	5.0	3500
10'	30'	100	3.0	2500

FINGERTIP CONTROL HYDRAULIC SPEED REDUCER

USE FOR: • Reamer Drives • Midget Cars • Feed Mills • Canning Machines • Conveyors • Lathes • Milling Machines • Motor Boats • Cream Separators • Garden Tractors • Pumps

Variable output speeds from 0 to input speed available by moving control handle. Locking handle maintains setting. Use input power of ¼ to 1½ H.P. This Westinghouse Oil Gear Unit consists of a variable displacement hydraulic pump feeding a fixed displacement hydraulic motor. Adjustable relief valves set at factory for 100 inch pounds of torque may be reset up to 180 inch pounds. Independent reverse control allows full output power and speed selection in either direction of rotation. Shafts measure ⅝" diam., include keyway. Input rotation is counter-clockwise facing shaft. Recommended input speed not to exceed 750 R.P.M. Over-all dimensions, 7½"x7½"x11½". Gov't acquisition cost, $428.00. Ship. wt. 31 lbs. Complete with 2 qts. of oil and full instructions. F.O.B. Chicago..... **54.50**

ARC WELDER

NEW MODEL 353—DUAL RANGE

for Stationary or Portable Use. Heavy Duty Range To 250 AMPS. New 'Magic Terminal' For Low Current 30 to 100 Amps.

IDEAL FOR • FARM • GARAGE • FACTORY • WORKSHOP. These precision engineered D. C. quality War Surplus aircraft components built to exacting government specifications. They are light in weight, have oversized lifetime grease-sealed ball bearings, air cooled commutator, dial type rheostat for easy pin-point control, a high-low rheostat switch, reactor coil for even arc and the new 'MAGIC TERMINAL' low current welding range for welding lighter materials. Designed for many years of trouble free service. Run welder from drive pulley or power take off of a tractor or Jeep. 7½ HP electric motor or 10 HP gas engine at 2500 R.P.M. Uses two V belts or flat belt. Continuous output rating 200 amps. Intermittent welding rating 250 amps, 30 volts. This sensational price includes double V or flat belt pulley and complete operating instructions. Ship. Wt. 107 lbs. $350.00 Value.
Item #65. Now only..... **119.50** F.O.B. Chicago

Welds Anything From Auto Fenders To Tractor Frames

GENERATING PLANTS AVAILABLE for IMMEDIATE DELIVERY

SHOP BY MAIL AND SAVE • Large Stock—Many Sizes from 350 Watts to 25 KVA

ITEM #301

TINY TIM BATTERY CHARGER

Item #301 Model 125 to charge 6 and 12 volt batteries—12 volts—300 Watts; Heavy Duty Generator; Push button self-starter; Sturdy single cylinder air cooled Continental 1.3 H.P. engine; 2 qt. gasoline tank in base; Ammeter; Generator cut-out; Concealed coil, etc.; Speed and charging rate control; Attractive orange finish; Weight 35 lbs.; Length 15½", width 11¾"; Height 14¾". F.O.B. Chicago **89.00**

Item #183—3000 to 4000 WATT GENERATOR SET—

FEATURES—Power for your home or business. Simply connect to power panel or house circuit. • Constant voltage regardless of load. • Push button start or stop. • Easily made full automatic start or stop. **SPECIFICATIONS**—Sizes 19"x30"x48". Steel skids, weatherproof housing, requires no building. Wt. 725 lbs. • Hercules 4-cyl. 16 HP gasoline engine. Load governor. Oil filter. Quiet muffler. 6-volt starter. generator • Hobart 115 volt, 60 cycle, 3000 to 4000-watt generator. Furnishes either single or three-phase power. 2 or 3 wire. • Panel contains oil gauge, voltmeter, ammeter, circuit breaker, voltage regulator, start button. Today's cost over $1200.00. SALE PRICE, F.O.B. Chicago..... **465.00**

ITEM #183

ITEM #300—Model C1B—3 KW—110 Volts D.C. This mighty mite develops 3 KW—28.5 amps. D.C. Standard Delco generator direct coupled to a Model ZZP Briggs and Stratton 1 cylinder, 5-7 HP, air cooled, rope starting gas engine. Instruments include voltage control rheostat & voltmeter. Ideal for Power Tools. Wt. 275 lbs. F.O.B. Chicago **295.00**

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MODEL 251

Item #2510

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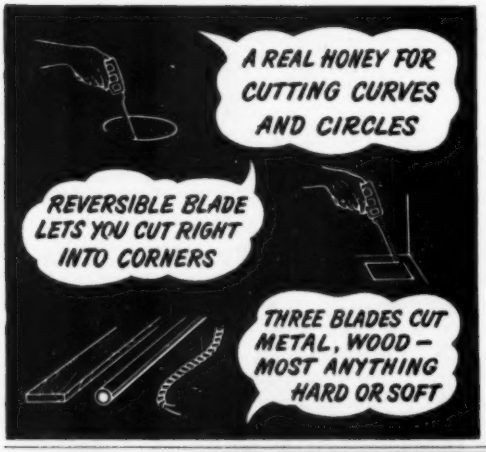

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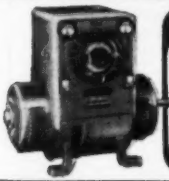

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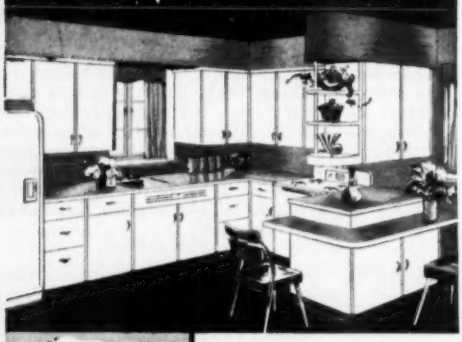

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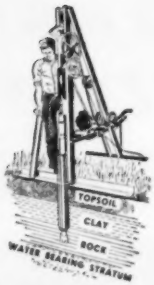

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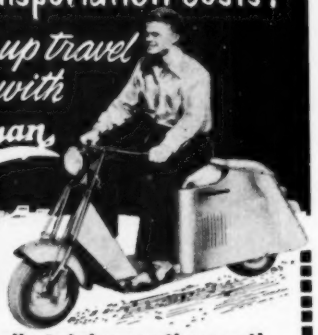

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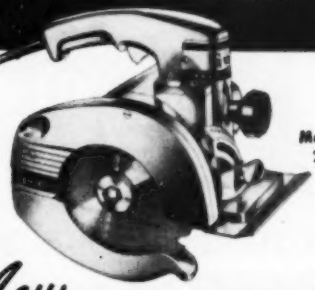

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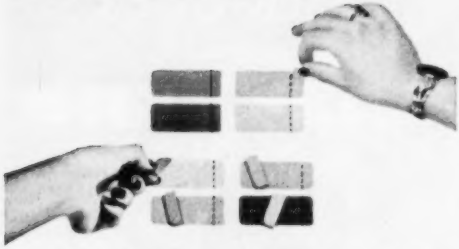

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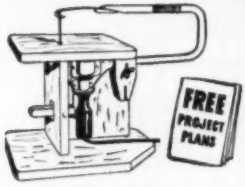

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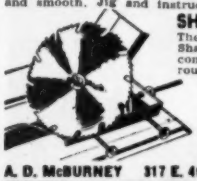

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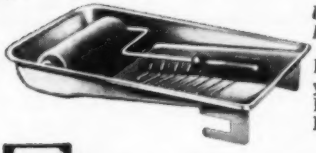

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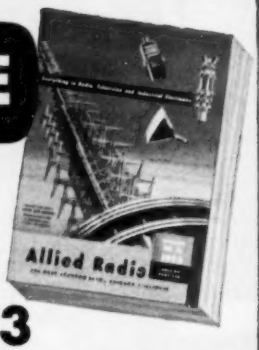

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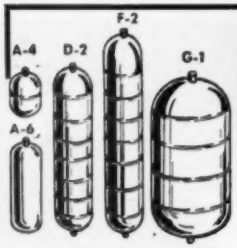

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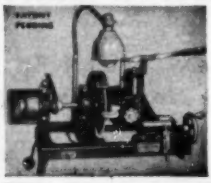

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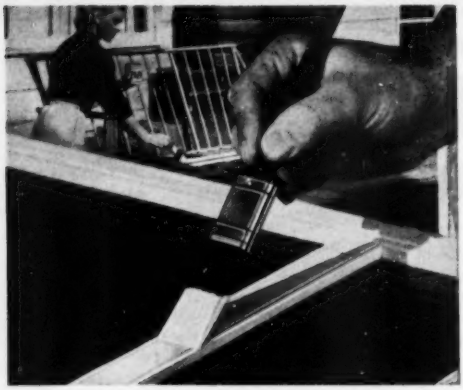

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Start in corners of walls, ceilings and floors, and paint away from them. Use a strong stroke and work steadily so paint doesn't set before adjoining strip can be applied.

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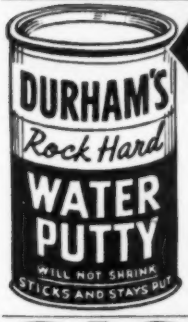

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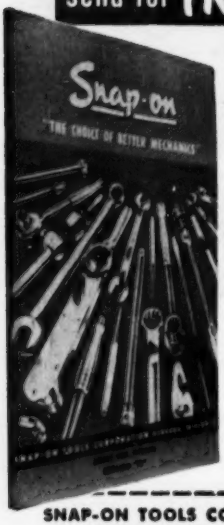

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The beautiful new Savage 20" ROTOR CHIEF knifes through practically anything—high weeds, matted grass, even underbrush! Its high-speed, propeller-pitched blade sucks grass upward, clips it off neatly—then spreads it in an even mulch that is good for your lawn. Clippings and debris are deflected to the side. Cuts close to walls, fences, walks. Does away with tiresome hand trimming.

100 YEARS

Nearly 100 years of engineering accomplishments and *gunsmith* craftsmanship are back of the Savage ROTOR CHIEF. Savage has used this experience to build a mower with the extra rugged construction and precision quality necessary to give outstanding, trouble-free service. You will recognize Savage gunsmith craftsmanship instantly. See a *Savage* at your dealer's this week!

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RUGGED STEEL frame, reinforced for rigidity. Briggs & Stratton 4-cycle engine.

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"We're sold on our Savage!"

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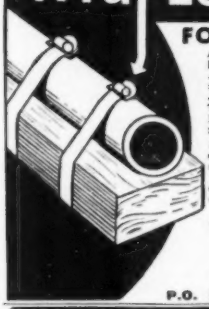

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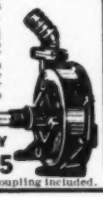

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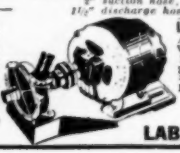

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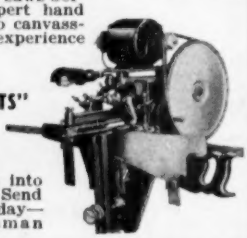

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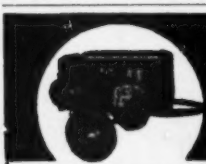

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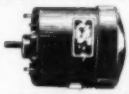

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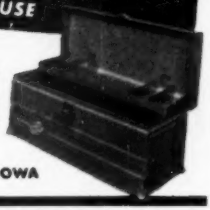

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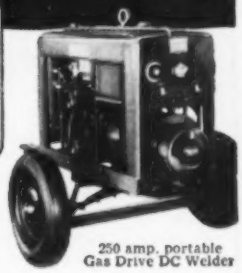

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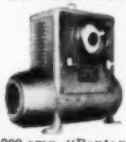

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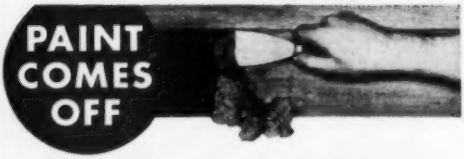

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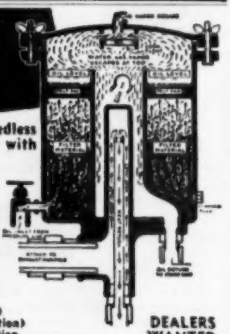

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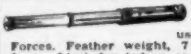

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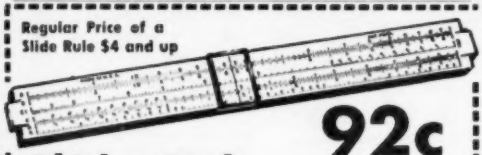

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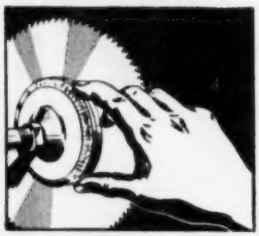

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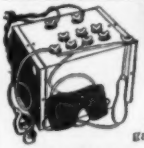

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Palley's

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NAVY PHONE SET

Used by the NAVY for Flight Deck and Gun Control. An ideal emergency communication system because each set is 'sound-powered' - no power supply needed. Perfect for office-to-shop, house-to-garage or barn, or any point-to-point within the radius of 1/2 mile. Each set includes 2 phones or chestplates, 2 headsets, button switches and approx. 35 ft of cable.

9.95 SET

One Phone and Headset 5.95 EACH

2-WAY TELEPHONES

Install this set of desk phones for perfect two-way communication from any two points up to 100 ft apart. This handsome set is finished in a blue baked enamel. Has 2 phones, wire and simple hook-up instructions. Operates on ordinary flashlight batteries. Here is an ideal set for use room-to-room, garage-to-house, barn-to-house, darkroom-to-outside, office-to-office, office-to-shop, etc. Order Today - ONLY 7.50

MARCHING COMPASS

Officer's type with a prismatic hair-line guide for sighting at distant objects and at the same time reading degree of setting. Accurate & dependable. Has a jewel mounted needle - luminous dial for night reading. A $5.95 value. 3.95

POCKET HAND WARMER

For Skier, Hunter, Fisherman, etc. Will maintain temperature of 100° from 16-24 hours by radiation. Uses pocket-warmer fluid, lighter fluid, or white gas as fuel. Has a chrome finish. Complete in velvet pouch. Extra Elements - 2 for 75c 2.25

NEW ARMY D-12 Magnetic Compass

A real WAR SURPLUS BARGAIN! Was standard navigational equipment on all Army Aircraft. Has a rotating verge range ring, calibrated in degree increments from 0 to 360°. Two pro jet grid wires for N-S alignment. Ideal for airplane, boat, etc. 17.50

LIGHT BARGAINS

NAVY SEALED BEAM

A portable search-spot light. Has a pistol grip and aiming sight. Makes an ideal spot, search or emergency light for Home, Camp, Car or Boat.

12 Volt light 4" lens 4.29

24 Volt light 5" lens 4.79

Set of 3 Filters (Red, Green, Amber). Specify Lamp size when ordering. Per set 99¢

FOUR WAY SWIVEL LAMP

A handy lamp for desk, work bench, chart table, engine room, etc. May be used on 6-12-24-110 volt current by simply changing the bulb. 3 ft shaft has four movable joints to adjust light position. 3.95

FLEXIBLE GOOSENECK LAMP

A SURPLUS BUY! For Home or Workshop. Uses 110 volt AC current. Has a flexible shaft, long cord with plug, switch and socket plus mount bracket. 1.25

FAMOUS PALLEY MIXES

WAR SURPLUS MIX. Four hand tools plus an Army Scoop for fireplace or barbecue. Tools alone are worth far more than our price but we throw in the Scoop FREE. Tools include a Hammer Punch, Chisel-Hammer, Stake Driver and 17" Stanley Screwdriver. All have crucible cast steel heads and hardwood handles. For home, farm, ranch, machine shop, garage, etc 2.89

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ORDER FROM THIS AD... Pay by M.O. or Check. P.O's accepted from well rated D & B firms. 50% deposit required with all C.O.D's. All prices are F.O.B. our warehouse, Los Angeles, Calif.

Genuine Army Type B9 PARKA

Outside made of extra heavy mountain cloth with full Beaver Fur Parka Hood which completely protects the head and face. Hood has adjustment for perfect fit. Lined chin protector and button-down neck closure. Coat is full cut with an elastic inset for snug fit. Has two deep slash breast pockets and two roomy side pockets. Waist length zipper is covered by an outer, button down storm flap. Body is lined in double thick, 100% wool with quilted rayon covering O.D. color. SMALL, MEDIUM, LARGE sizes 28.50 NEW

"Blue Bunny" FLYING SUIT

For WINTER SPORTS, HUNTING or "BUNDLING". As coveralls for cold OUTDOOR or FARM WORK. It is 100% woven wool with an extra flannel inner-lining for double warmth and utility. Has wiring so fine, flexible, it does not interfere with movements. Can be used with or without heating or can be plugged into car, tractor or Truck battery. Sizes 36 thru 44. 4.95

LEATHER MITTENS

Fleece lined. Outside cover is quality leather. Ideal for all types of winter work. Size: small, med, lg 2.69

Air Corps Type LEATHER CAP

Special! For Hunter, Camper, Farmer. All leather with soft chamois lining. Has turn-down ear flaps, covered with warm sheepskin for added ear protection. Leather covered, long billed peak. Sizes: Small, Med., Large. 2.59

SHEEPLINED BOOTS

A REAL BARGAIN. All NEW! 100% waterproof & designed to be worn with or without shoes. Lined throughout, including tongue, with soft fleece sheepskin. Water repellent leather uppers with waterproof rubber lowers. Heavy non-skid tread on soles. Full zipper closure. Height approximately 12". SMALL, MED., LARGE 13.95

WESTINGHOUSE COMPRESSOR

A 2 cylinder, piston type Air Compressor ideal for spraying, inflating, air tools. Used in garages, shops, laboratories - on trucks, tractors, jeeps etc. Will run off fan belt or power take-off. Operates on 1/2 HP Gas or Electric motor. Runs in either direction. Delivers approx. 3.27 CFM at 600 RPM or 6.54 CFM at 1200 RPM. Has 2" bore, 1-1/2" stroke. Automatic cut-out. Size: Width 9", height 11-7/8", depth 5-3/4". Approx. weight 23 lbs. We have motors, tanks and fittings to adapt this unit. ONLY 23.95

230 PAGE CATALOG

1000's of ITEMS! Fully ILLUSTRATED! For the MECHANIC, SPORTSMAN, HOBBYIST, HOME OWNER, etc.

War Surplus - Factory Closeouts and General Merchandise Values! Save on Hardware, Hand and Power Tools, Gadgets, Sports Equipment, Hydraulics etc. SEND 25c for HANDLING & MAILING.

SAVE ON SURPLUS MOTORS

606 DELCO MOTOR

1/50 HP, 24V, DC, 1.6 amp. turns 3000 RPM. Has adj. over speed contactor to stabilize and control speed - Length 5½" 4.95

SURPLUS ½HP MOTOR

No. 508 - Used - 1/2 HP - 27v, DC-4C. This motor can be readily adapted to deliver up to 1/2 HP on 110 volts AC, by the simple method of rearranging armature brush-leads. Free diagram with each order. Supply is limited so order today. A SENSATIONAL VALUE. 5.95

1/5 HP SAMSELL MOTOR

27 volts, 16 amps., 1/5 HP, reversible, series wound motor 3800 RPM, shaft 9/32" diam. 12" spline. 4-1/8" x 2-3/8" NEW - ONLY 3.95

6 TAKE-OFF DRIVE UNIT

All six drives turn in unison at a ratio of 1 to 1. This unit is adaptable to use with standard 9/32" flex drive shafts & accessories. Many uses where one to five take-offs are desired. This item is worth at least twice our price 4.75

RADIO BARGAINS

Popular Telephone Type. Highly sensitive. Has excellent, clear tone. Was the Signal Corps favorite. An ideal instrument for the Radio "Ham" and the professional recording studio, for broadcasting, home recording, public address systems, etc. Unit comes complete with cord & plug. 3.29

USAF THROAT MICROPHONE

Genuine USAF type T-30-0. Gives clear, distinct voice reproduction for aircraft or the amateur broadcaster. Set consists of two microphones, mounted on rubber neckpiece which is fastened to elastic neck band. Operates between 100 and 300 ohms. 1.39

NEW RADIO SPEAKERS

Ideal for small radios, inter-com systems, test equipment, etc.

ALNICO - Permanent magnet type. 4" diam. 2 wire hook-up. NEW 2.49

DYNAMIC SPEAKER - 10" with plug-in and transformer. A popular model for use in radio sets, TV receivers and portable Public address systems. Has full tone range. Standard rim mounting. A Bargain. 2.95

16MM SURPLUS MOVIE CAMERA

The Gun Camera used by the Navy & U.S.A.F. Electrically operated. Ideal for the amateur or professional movie maker. Lens is a 1-3/8" (35mm) with a built-in exposure guide and shade. Adjustable for THREE SHUTTER SPEEDS 16, 32 and 64 frames per sec. Uses regular Eastman (50 ft.) magazines. Comes complete with 200M viewfinder and battery box. Requires no winding - operates on 24 volt current supplied by ordinary dry cell batteries carried in box that clips on belt. Takes excellent Black & White or Full Color films. Cost Gov't approximately $300.00. 44.95

CONVERTED MODEL - Rebuilt with a special "C" mount adapter for any standard 16 mm movie lens. 59.95

FILM (50 ft.) B&W - $3.00 Set of Batteries - $1.75

NEW PIANO HINGE

1½" x 53½" Cad. Plated Steel . 89c

1¼" x 72" Aluminum 1.29

2½" x 54" Stainless Steel 1.95

PALLEY SUPPLY CO. Dept PS4, 2263 E. Vernon Ave., Los Angeles 58, California

Saucers on Radar?

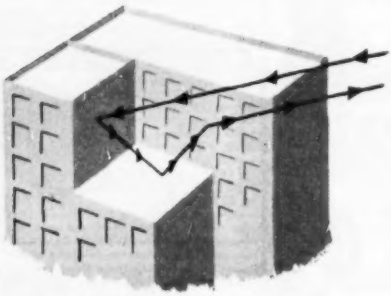
[Continued from page 268]

beach complained that they had the poorest reception when they were most interested in using their set, namely when the weather was so stormy that they could not enjoy the out-of-doors. The differential between good and bad weather would be even more marked were it not for the automatic volume control built into the TV receiver specifically to correct for the unavoidable scintillations.

A meter that I have had built into the AVC of my Zenith receiver clearly shows the heavy scintillations and also the long-distance reception associated with the warm, dry weather.

Building Bounces Waves

I believe such atmospheric conditions caused the darting "saucers" seen by the Washington radar operators. The signal beam from the rotating radar antenna strikes a patch of warm air, which turns the beam back to the earth where it strikes some building. If the building has upper stories in the form of two wings that meet at right angles above a roof, the adjacent walls of the wings form, with the roof, a natural example of what radar operators term a "corner reflector."



A radio wave coming down and striking one wall will bounce successively off the roof and the other wall, to travel back essentially along the path from which it came. Buildings that possess these natural reflectors stand out sharply as radar targets among those structures that do not have the corners. Thus, the operator who is unaware of the effect of the warm air may think the building is a flying saucer.

10 Miles per Minute

But what about those reported rapid motions? Speeds up to 600 miles an hour, or 10 miles per minute! Certainly the building isn't moving! No, but the hot-air layer is rocking, tilting and shifting—so that each time the beam from the rotating antenna sweeps past it at intervals of from 15 to 20 seconds, the reflected ray picks up a new corner reflector. The radar operator, accustomed to interpreting moving blips in terms of an actual target, becomes excited and interprets the whole phenomenon as a speeding saucer.

The reported behavior of the "objects" is the final pay-off. The Washington saucers were observed to "move" in straight lines and then execute sharp right-angle turns. Here the saucer may disappear, or it may reverse itself sharply over its right-angle course, returning to its initial position.

Nothing to Intercept

Any conventional plane would sweep out a curve, since right-angle turns defy all laws of mechanics, to which even flying saucers would be subject if they were vehicles or moving objects. Only reflections can veer thus sharply. The right-angle array is the not infrequent lining up of large buildings along streets or highways.

No wonder that jet planes, screaming into the night, found nothing to intercept! END

Animals Live Without a Drink

KANGAROO rats, pocket mice, prairie dogs, gazelles and dozens of other desert animals pass their whole lives without touching a drop of water. The liquid necessary for their bodily needs is obtained through chemical action in their digestive tracts, which changes some of the starchy parts of their food into water.

MASTER GARDENER

NO PUSHING SELF-PROPELLED
It's a lawn mower
It's a power sickle
It's a cultivator
It's a rotary tiller
It's a bulldozer
It's a plow

Tractor shown with Rotary Tiller Attachment

Where else can you get a power tool that does so many jobs. Works for you year round. **Item 206** Does terrific job of preparing mellowed deep seed bed without labor. Built-in power take-off to drive pumps, saws, generators, etc. Safety clutch—can't burn out. More versatile and efficient than tractors costing twice as much. Converts in minutes to Lawn Mower, Power Sickle, etc. Basic self-propelled 2 hp tractor with Briggs or Clinton famous engine. Only **$119.50**

Snow Blow **$39.50**
Rotary Tiller **$42.50**
Sickle Bar-Mower **$42.50**
Furrowing Tool .... **$ 8.75**
Lawn Mower Hitch .... **$ 4.50**
Cultivator .... **$ 8.75**
Disc Harrow **$15.75**

Freight prepaid to most areas. Easy payment plan available.

32 Pc. SOCKET SET

Highest quality guar. non-breakable sockets made by Husky. Beautiful, matched chrome alloy, absolutely the best. Complete range of 21 sockets from 1/4" thru 7/16" in 1/4" drive and 7/16" thru 1-1/16" in 1/2" drive: 2 extensions, reversible 1/2" ratchet, adaptor bit, slide head, all angle coupling, 2 end wrenches, 1/2" speeder handle and sturdy metal tool box. For prof. mechanics who want the best. Wt. 14 lbs. (Item 59) Easily worth $41.50 .... **$16.95**

45 Pc. SOCKET SET

(Item 205) Contains a complete set of sockets in 1/2" drive, 3/8" drive and 1/4" drive, plus all necessary extensions, handles, speeders, reversible ratchets, etc.; all uncond. guaranteed against breakage. Beautiful matched chromed thin wall alloy sockets in a sturdy handsome steel tool box. Wt. 17 lbs. List price $62.90. Factory Special **$26.95**

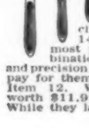
6-Pc. MAGNETIZED Screw Driver Set!

Permanently magnetized tempered and hardened tool steel blades. Plastic handles — unbreakable and shockproof. Picks up and holds screw in tight spots. Makes impossible jobs easy. You get following types: Midget, stubby, close quarter, cabinet, thin blade, machinist, heavy duty, extra heavy duty. Fully guaranteed. Easily worth $4.95. Item 106: wt. 3 lbs. Special **$1.95**

3-Pc. ADJUSTABLE WRENCH SET

Made of finest steel alloy, chrome plated. Prices are exactly half actual value. Takes the place of a whole set of tools. Packed in leatherette pouch.
Set A—4-inch, 6-inch, and 8-inch wrenches, (Item 107), wt. 2 lbs., only **$2.95**
Set B—8-inch, 10-inch, and 12-inch wrenches, (Item 108), wt. 4 lbs., only.. **$6.45**

3-Pc. PIPE WRENCH SET

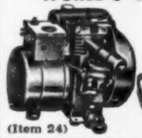


Made of finest German Tool Steel, Completely drop forged. Pipe sizes clearly marked for easy one-hand setting. Heavy sharp jaws will never slip. Ideal for master craftsmen. Set includes 8"—10" and 14" wrenches. Covers most pipe sizes. A combination of brute strength and precision workmanship. Will pay for themselves on one job. Item 12. Wt. 6 lbs. Easily worth $11.95. While they last....... **$6.55**

BEDROCK FACTORY PRICES

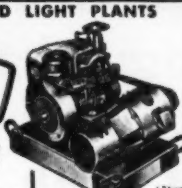
Discounts 50 to 85%

WORLD'S FINEST GUARANTEED LIGHT PLANTS



(Item 24)

(Item 31)



(Item 162)

PORTABLE LIGHT PLANTS PUSH BUTTON START A.C. PLANT 500-700 watts—115 v.—60 cyc. A.C. Powered by a rugged 2 hp. easy-starting Briggs gas engine. No wiring necessary, just plug in and operate. Plenty of current for any oil burner, freezer, brooder, emergency lights, etc. which require up to 700 watts. Ideal for Civil Defense, Fire Depts., trailers and camps. Complete with Voltmeter and built-in winding to charge 6 v. auto batteries. Item 24. Wt. 85 lbs. Fully Guaranteed. *Be prepared if war or storm knocks out power lines.* Reg. $275 value. **$143.50**

700-800 Watt Plant (Item 44) same as Item 24 but larger engine..... **$169.95**

1000-1200 Watt Plant (Item 45) same as Item 24 but larger generator & engine **$199.50**

350 watts—115 v. D.C. powered by a sturdy, easy-starting 1 1/2 hp. Briggs engine, perfect for lights, radios, cabins, trailers, etc. Built-in control box with receptacle—just plug in. Wt. 65 lbs. Item 273. Reg. $199.50 value.......... **$99.75**

GIANT 2000-2500 WATT PLANT

110-120 V. 60 cyc. A.C. **Absolutely the best made** — exclusive dynamically balanced armature: heavy windings develop up to 5000 watt overload for motor starting. Skid-mounted—portable. Powered by easy starting Briggs or 6 hp. Wisconsin engine — complete with all accessories; engine easily disconnected for other uses. Big outlet box, voltmeter, no wiring necessary. Ample current for all purposes. Factory warranty and complete instructions included. Wt. 220 lbs. Reg. price $585.00. Special at.......... **$299.50**

With Electric Self Starter **$359.50**

Generator Only and control box. Drive it with your engine or tractor **$169.50.**

3000-3500 WATT PLANT (Item 198) 110-220 v. 60 cyc. A.C. with Wis. Engine. **Push button start.** Wt. 370 lbs. Heavy duty **$399.50**

Generator only for belt drive, Wt. 115 lbs. (Item 198A) **$239.50**

HI-LINE 6000 WATT PLANT

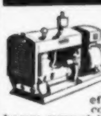
(Item 162) **Push Button Start,** 115-230 v. 60 cycle A.C. A brute of a power plant with a rugged 13 hp. Wisconsin engine. Plenty of electricity for ranges, water heaters, freezers, pumps, machinery, etc. Affords both 110 and 220 volts. Ideal where heavy current is needed. Wt. 590 lbs. Easily worth $995.00. **With self starter.** Factory price......... **$645.00**

Same plant but with **Crank Start.** Item 166..... **$585.00**

Generator and control box only, belt driven. Use your own engine or tractor. Wt. 240 lbs. (Item 163) Factory price.... **$345.00**

We make fully automatic controls to operate any of above light plants. Write for details.

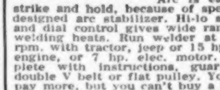
DIESEL LIGHT PLANT



(Item 1660) **Diesel Master**—11-12 kw. 115/230 V. A.C. single or 3 phase. 1800 rpm. direct connected. Designed and engineered for permanent power installations. Assures efficient, dependable low cost operation where heavy current is important. Wt. 1350 lbs. Regular list $3,650.00. Factory price **$1895.00**

10-11 kw. GAS DRIVEN PLANT. 115-230 V. 60 cycle A.C. powered by 4 cylinder Wisconsin air cooled gasoline engine. Direct connected. With self starter. Constructed similarly to Item 1660. Item 217 wt. 900 lbs. Factory price.. **$1175.00**

HEAVY DUTY D-C ARC WELDER



with mounting flange

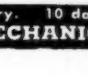
Use as portable or shop welder. Up to 300 amps. Senior model. Made for years of trouble-free, continuous service. Will handle light or heavy jobs. Easily welds up to 3/4" plate using 1/4" rods. Built-in air cooling system. Arc is easy to strike and hold, because of specially designed arc stabilizer. Hi-lo switch and dial control gives wide range of welding heats. Run welder at 2600 rpm. with tractor, jeep or 15 hp. gas engine, or 7 hp. elec. motor. Complete with instructions, guar. and double V belt or flat pulley. You can pay more, but you can't buy a better welder. (Item 38) Wt. 110 lbs. $400 value at......... **$99.75**

DUAL CONTROL MODEL same as above but with built-in dual rheostat for low heat soldering, brazing, welding. Spec.. **$119.50**

WELDING KIT. Two 10 ft. leads, welding helmet, electrode holder, ground clamp. Sold only with welder at........ **$10.50**

Write for prices on A.C. Arc Welders.

Factory Prices on Catalog Items



Send 10¢ for **BIG 1953** catalog. **Hundreds of bargains**

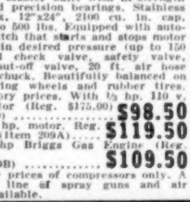
DIESEL ENGINE

GET QUICK DELIVERY SAVE BIG MONEY

Powerful, smooth running for industry, farm, irrigation, saw mills, pumping, etc. Economical operation, cutting costs to the bone. Electric starting. Complete with clutch. Power take off. Ready to run. Best made. Easy to start. Factory priced to save our customers big money. Order from these four rugged units or write for complete details:

27 Horse Power Engine ..... **$895.**
42 Horse Power Engine.... **$1,095.**
50 Horse Power Engine.... **$1,355.**
72 Horse Power Engine.... **$1,795.**

MASTER AIR COMPRESSOR



(Item 209) High pressure type for large volume of air for heavy duty service. For paint spraying, inflating truck and autotires, greasing, and the hundreds of other jobs done by compressed air. Piston type. 2" bore compressor with built-in air filter. Master built with hi-strength alloys and precision bearings. Stainless steel tank, 12"x24", 2100 cu. in. cap. Safe up to 500 lbs. Equipped with automatic switch that starts and stops motor to maintain desired pressure (up to 150 lbs.) and check valve, safety valve, gauge, shut-off valve, 20 ft. air hose and tire chuck. Beautifully balanced on ball bearing wheels and rubber tires. Low factory prices. With 1/3 hp. 110 v. A.C. motor (Reg. $175.00) (Item 209) **$98.50**
With 1/2 hp. motor. Reg. $199.50) (Item 209A)..... **$119.50**
With 2 hp Briggs Gas Engine (Reg. $199.50) (Item 209B) **$109.50**

Write for prices of compressors only. A complete line of spray guns and air tanks available.

NEW MOTOR BIKE

Our Commando Motor Bike is trouble-free—carries amazing 5 yr. guarantee. Goes to 150 miles per gal. on all roads. Speed to 40 mph. No oil or gas fumes. Easy automatic pedal or pull starting. Has new principle of automatic transmission. No belts or chains—power transmitted directly to rear wheel. Accelerates quickly. Get free folder. Complete motor and kit ready to attach to your bike in 1 hour. Factory Price.................. **$125.00**

Variable Speed Selector

(Item 68)

Heavy duty, made by **B. F. GOODRICH** for industrial use. Provides instant speed changes for any drive. For machine tools, dryers, printing, conveyors, production lines, hoists — any operation requiring variable speed. Ideal for midget autos. Employs reliable "trouble free" planetary system. No hydraulic power losses or creeping. Infinite range, smooth operation, easy installation (data included). 3 sizes: 1/2-1 hp. wt. 36 lbs.; 1-2 hp. wt. 55 lbs.; 2-3 hp. wt. 105 lbs. Reg. list $228, $252 and $352. Our prices . . . **$79.50, $89.50** and **$114.50.**

VENTILATING FAN

(Item 10) Mount in wall or ceiling to ventilate any area. Over range, removes kitchen smoke and odors. Easily installed in furnace pipes. Forces even heat to all rooms. Powerful continuous duty motor, 110-120 v. A.C. Quiet, super efficient fan moves huge volume of air (400 to 600 c.f.m.) 8" Fan, wt. 5 lbs., **$6.85;** 9" Fan, wt. 6 lbs., **$7.85;** 10" Fan, wt. 7 lbs., **$8.85;** 12" Fan, wt. 8 lbs., **$9.85.**

HEAVY DUTY FAN. Semi-enclosed motor, suitable for spray booths, restaurant exhausts, poultry houses, and other applications. 10" Fan, wt. 8 lbs. Item 10E............. **$11.95**
12" Fan, wt. 10 lbs. Item 10D.............. **$12.95**

EXTENSION CORD

(Item 16) 40 ft. **heavy duty,** made of specially insulated No. 14 2-conductor wire. So tough that you can drive over it and yet flexible and easy to handle. Resists oil, grease or water. Extends electricity up to 400 ft. without voltage drop. Use indoors or out. Complete with heavy rubber plug and outlet. Wt. 2 1/2 lbs. Usually $4.50—Special 40 ft........ **$1.99**
Comb: 2-40 ft. and 1-20 ft. (total 100 ft.).............. **$4.95**
100 ft. length (one piece) **$4.85**
WIRE ONLY (Item 50) No fittings. 100 ft....... **$4.00**

Heavy Duty Power Cable

#12—2 Cond.—stranded, very flexible, rubber covered, special outside conductor for grounding power tools, etc. Finest heavy duty power cable made. 50 ft. (Wt. 8 lbs.) Item 199.. **$6.95**
100 ft. (Wt. 16 lbs.) Item 200............. **$12.95**

HYDRAULIC JACKS

Heavy duty, precision built, smooth, positive acting with built-in relief valve. Hi-Lift with screw extensions. Govt. surplus at a fraction of orig. cost. (Handle included.)
3 ton (Item 208A) Wt. 15 lbs. **$9.45**
5 ton (Item 208B) Wt. 17 lbs.... **$11.45**

Prices f.o.b. Factory. 10 day Money back guarantee. Send check or Money Order

MASTER MECHANIC MFG. CO., DEPT. 37-C **Burlington, Wis.**

Precision Accuracy High Versatility——

SOUTH BEND
14" DRILL PRESS

Built to extremely close tolerances, this drill press is capable of the most exacting precision toolroom operations, yet it is ruggedly constructed to give long, dependable service on heavy production jobs. Exclusive features including built-in shielded work light, belt tension release, wide clamping rib under edge of table, and precision work surfaces add to its versatility, convenience and ease of operation. Made with ⅓ or ½ h.p. motor and standard spindle speeds 720 to 4325 r.p.m., it drills to ½" in steel. Also floor models, multiple spindle models, and streamlined economy models. Write for catalog.

14" Precision Model Bench Drill Press

Send For This Book!

"How to Run a Drill Press"—Tells how to lay out work, set up jobs, sharpen drills, and use drill press attachments. Special classes of work such as drilling glass, buffing, mortising, etc., are included. Contains 32 pages and over 75 illustrations. Price postpaid 25 cents.

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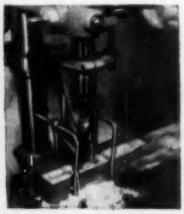

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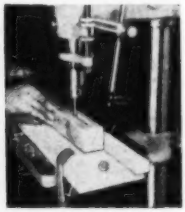

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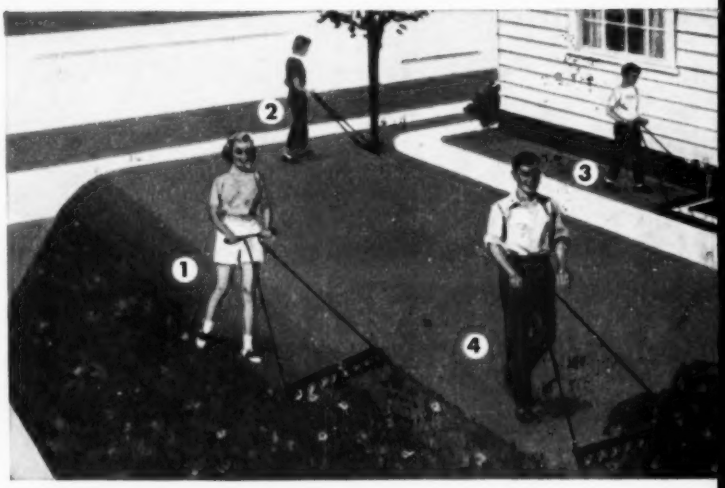

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